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A STUDY OF THE RELATIVE EFFECTIVENESS OF SELECTED APPROACHES TO THE IN-SERVICE EDUCATION OF TEACHERS IN THE UTILIZATION OF IN-SCHOOL RADIO AND TELEVISION BROADCASTS.

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AUDIOVISUAL PROGRAMS AND GUIDELINES FOR TEACHER EDUCATION WERE DEVELOPED AND TESTED. THE SAMPLES WERE RANDOMLY SELECTED FROM TEACHERS AND PUPILS AND ASSIGNED FOR RADIO AND TELEVISION INSTRUCTION TO EITHER THE CONTROL GROUP OR ONE OF 15 EXPERIMENTAL GROUPS. THE DATA WERE COLLECTED FROM QUESTIONNAIRES AND OBJECTIVE SUBJECT MATTER TESTS. ANALYSES OF VARIANCE WERE PERFORMED. THERE DID NOT APPEAR TO BE A DIFFERENCE BETWEEN THE CHOICES FOR RADIO OR TELEVISION AS A TEACHING MEDIUM. THE TEACHER WORKSHOP WITH PRINTED MATERIALS WAS THE MOST EFFECTIVE OF THE FOUR PROCEDURES TESTED. (RS)

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By

M. W. Glasgow

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INTRODUCTION

In making the proposal for Title VII funds for an experimental project, the managements of Radio Station WNAD AM - FM and television Station KETA-TV envisioned that the experimental procedures within the context of an adequately determined design would reveal certain information which would be pertinent to the development of more adequate programs of mass media service. The general framework for such a study would involve dual-media, multi-county, inter-school system, and multi-graded situations. The two media of teaching, radio and television, in this study were chosen because the University of Oklahoma was operating a "school of the air" over its radio station, WNAD, and considerable pioneering work had been done in Oklahoma in the field of instructional television in its public schools via KETA-TV and a satellite station, KOED-TV. Accordingly, it was proposed that a study be made bearing upon the relative effectiveness of selected methods of in-service education of teachers in the utilization of in-school radio and television broadcasts. Consequently, in order to test the effectiveness of the selected methods of in-service education, this study incorporated different geographical areas, several school systems, various subject-matter[1] areas and a spread of grade levels.

Need for the Study

Many excellent programs of teacher education in the utilization of audio-visual aids to the classroom have been initiated in the post-war

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[1]See Table 2

period. Much of the emphasis in these programs, however, and the research on which they were based, has been on the classroom film. Relatively little research has been done on the problems of better utilization of in-school radio and television. Almost without exception, such post-war studies of in-school radio and television that have been made have concentrated on two questions:

1. Is the in-school broadcast or telecast an effective teaching aid?
2. How can the radio or television teacher do his job most effectively?

Precisely, the emphasis has been on the development of better teacher transmitters with little or no research effort devoted to the development of better teachers as receivers of educational broadcasts. Since educational research rather consistently indicates that the classroom teacher is the key to the utilization of any given educational procedure, technique, or teaching aid, this study proposed to concentrate on the problem of classroom utilization of in-school radio and in-school television.

Problem

The problem was a study of the relative effectiveness of selected approaches to the in-service education of teachers in the utilization of in-school radio and television broadcasts.

One of the objectives of this study was to develop and test programs of in-service education for classroom teachers in the utilization of in-school radio and television as a method of increasing the state-wide effectiveness of on-going programs in Oklahoma. Another objective was to develop guide lines for in-service education programs in the utilization of in-school radio and television for the use of other states in the development of such programs.

Purpose

The purpose of this study was to seek answers to the following questions:

1-a. To what extent is the effectiveness of in-school radio increased by the provision of one or more of the four supervisory methods - workshop, visitation, printed-material, and sound tape - for the participating teachers?

1-b. To what extent is the effectiveness of in-school television increased by the provision of one or more of the four supervisory methods of in-service training - workshop, visitation, printed-material, and a sound film - for the participating teachers?

2-a. Which one of the four supervisory methods in 1-a is most effective for the in-service education of teachers in the utilization of in-school television?

2-b. Which one of the four supervisory methods in 1-b is most effective for the in-service education of teachers in the utilization of in-school television?

3. Which one of the four[1] selected methods is most appropriate to each of the several problem areas included in a comprehensive program of in-service education in the utilization of mass media in the classroom?

Experimental Design

In testing the questions 1-a and 1-b pupils in all classes taught by a teacher receiving any one of the in-service programs became the population from which an experimental group was selected. All pupils listening

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[1]In dealing with this question, sound tapes, television in-service education programs and the sound film were considered <u>one</u> method and referred to as audio-visual.

to the in-school radio and television broadcasts, whose teachers did not receive one of the in-service education programs, constituted a control group from which a sample was chosen for comparison with the different cells of the experimental group.

To compare the mean achievements of the experimental and control groups of the participating students, appropriate objective tests of factual information and understandings taught in selected in-school radio and television programs were given. Since there were no standardized achievement tests available for most of the specialized areas taught via radio and television, it was necessary to use objective achievement tests constructed by the studio teachers. This objective phase of the study was not the primary object of the research, but was actually a control on the basic problem of in-service education. Therefore, it was necessary to acquire evidence to test the hypothesis that in-service training of teachers does make a difference in the effectiveness of in-school broadcasts and to give some indication of the amount of difference such programs might make.

To test questions 2-a, 2-b, and 3, which attempt to determine the relative effectiveness of the four single methods of in-service education and to discover the optimum technique for each of a given number of problem areas in the use of mass media in the classroom, a different procedure was used.

The entire experimental group of teachers constituted an evaluative panel. As this group of teachers was exposed to different methods of in-service training in the classroom use of radio and television, they were given an opportunity to respond to evaluative instruments. The data and conclusions of this subjective phase of the study represent the pooled judgment of the teachers who participated in the evaluation of the program.

Methods of In-service Education

To the extent that was practical, all supervisory methods dealt with the same content material because the object of the experiment was to measure the effectiveness of the different methods rather than the effectiveness of different content. In general, the four supervisory methods selected for this project functioned as hereinafter described.

Workshop programs were planned to help teachers who had previously used radio and/or television programs in the classroom, as well as teachers to whom the use of the broadcast media was a completely new experience. The membership of the workshop, therefore, necessitated an orientation to the use of the media. Resource speakers, panel discussions and question-answer periods were the techniques used to present the potential and limitations of instructional broadcasting, the function and use of study guides, responsibilities of the television teacher, the classroom teacher and the student, and proper use of the radio and television receiver equipment in the classroom. Small groups were arranged for discussion and for demonstrations of classroom use of selected television programs. Experienced teachers and some of their students were responsible for the demonstrations. Exhibits of materials prepared by classes, bibliographies, sources of additional experimental materials for classroom use, and ideas from experienced teachers were available to all participating workshop members.

Teachers who were to use radio programs in the classroom met in small groups to audition some of the tape-recordings of the programs which were to be scheduled. They prepared suggestions for the teacher's guide which was to be sent to all teachers who would be using the radio programs, and made suggestions for types of special materials which would be sent to certain of the teachers in the project. They also had the opportunity to

preview a few selected films that were suggested as supplements to the radio programs.

All teachers in both radio and television divisions of the workshop had an opportunity to view one or more educational television programs, to see the educational television station's studios, and to talk with television production department personnel. The workshops included summary sessions and opportunities for evaluation of the workshop experiences.

Teachers who were in the category for visitations were visited by one or more of the supervisory visitation team. The supervisor tried to visit the class during the pre-broadcast preparation period, and remain for some of the follow-up period after the program. At times the class drew the visitor into the discussion following the program. The visitor also arranged for a conference with the teacher, if possible. The visitation was more than a visit. It was an opportunity for the teacher to express her feelings about the listening-viewing experience. The supervisor was helpful with such physical environmental factors as placement of the set in the room, control of light or glare, proper tuning of the set, etc. The supervisor answered questions the teacher had about future programs in the series, and acted as a liaison between the classroom teacher and the studio teacher. The supervisor helped the teacher with problems such as using the tape recorder, integrating the program into the curriculum in science or social studies, etc., with suggestions for additional reference materials on the subject of the program.

The supervisor gave recognition for observed evidence of good teaching methods. Often an idea for utilization of a program was picked up to be shared with other teachers. To make the in-school radio and television programs most effective, it was often necessary for the receiving teacher

to develop new methods of teaching procedures. Utilization techniques, which were unique to the media, were in the process of discovery and exploration of development. Supervisors and teachers were urged to approach this portion of the project with an attitude of willingness to discover and develop some technique that would help to make the use of an in-school radio or television program a more effective learning-teaching experience.

Printed materials which were mailed to all teachers in both the radio and the television divisions included the study guide for the program, the end-of-the-course test, and evaluation sheets. Special printed materials for both radio and television were prepared for the teachers in the categories to receive this service. This material included some information on the philosophy of educational broadcasting, orientation of receiving teachers, the use of study guides, the responsibilities of the classroom teacher and the student, suggestions for tuning and adjusting radio and television receivers, and suggestions for pre-broadcast and follow-up activities. In addition, some of the printed materials furnished to the radio groups were resource materials for some of the programs.

The material that was tape-recorded and mailed to certain teachers for their use in the radio part of the project chiefly followed the pattern of the material presented in the printed material's division. There was slightly less emphasis on factual information, and more emphasis on sources of factual information and suggestions for procedures on the tapes than in the printed materials.

A ten-minute sound film on the utilization of television in the classroom was to serve as the fourth method of in-service education. However, the film was not completed in time to be used during the first year of the project. Hence, talks, discussions, and demonstrations relative to the

effective use of television in the classroom were telecast periodically as a substitute for the film while it was in the process of being made. Only the teachers who were in the film cells were notified of the schedule of these telecasts.

The film was prepared during the first year of the project and was used during the second year as an aid to certain teachers using television in the classroom.

The film touched upon the purpose of televised instruction, gave suggestions for making the physical environment for viewing in the classroom conducive to optimum attention, and demonstrated the classroom teacher's role in the preparation for the viewing experience and follow-up activities which provided active participation for the pupils. Sequences were filmed in classrooms of both elementary and high school levels. The concluding comments on the film summed up the "moral": that televised instruction can be integrated into the whole activity of education and that "utilization in the classroom is a matter of teamwork between the studio teacher, the classroom teacher, and the students, but that the classroom teacher is the key person who can make the difference between a true learning experience and a mere classroom interlude." Since there were seven prints of this film available for circulation, all eligible teachers had access to a film print in a reasonably short period of time.

Hypotheses

In order to get the answers to questions 1-a and 1-b as stated - the effect that the various combinations of the four supervisory methods had upon pupil achievements - the questions were formulated into three null hypotheses.

1. There is no statistically significant difference in mean achievement of pupils with teachers who had received different combinations of the four supervisory methods: workshops, visitations, special printed materials, and sound tapes when radio was used as the media for teaching.

2. There is no statistically significant difference in mean achievement of pupils with teachers who had received different combinations of the four supervisory methods: workshops, visitations, special printed materials, and sound film when television was used as the media for teaching.

3. There is no statistically significant interaction among any possible combinations of the four supervisory methods.

Since the objective phase of the study used the four supervisory methods singly and in all possible combinations, a four-factor design was required to test for the effects of interaction among the four methods. Such a four-factor analysis of variance design made it possible to extract from the resulting data virtually all information it contained.

Sampling

When teachers were first approached to participate in this study, there was some hesitancy on the part of a number of teachers to do so. The reasons indicated for their reluctance were: they were already overloaded, they thought they might be compared with other teachers, and they were not too anxious to be visited. However, when the project was fully understood, there was a rising interest in the idea, and they expressed an agreement with the majority that the experience should be challenging and profitable.

The radio phase of sampling was begun by contacting all enrollees registered with WNAD for the radio program which was to be used in the project. It was found that many of said enrollees did not have a radio - they had enrolled merely to get the free material which they could use in their regular teaching. The radios possessed by or available to teachers ranged in quality from fair to very poor. It seemed that radio utilization had been quite incidental, not only to many teachers, but to school administrators as well. During the past few years, due to grant money, the use of television has been pushed in Oklahoma to such an extent that what little money was available for new equipment of this nature was probably spent for television receivers.

The project was explained individually to those teachers who had radios of usable quality, and as many of the teachers as possible were enrolled. However, this effort did not provide the desired number of participants.

The radio program was planned for grades four to seven. Since there were fewer television broadcasts and no social studies telecasts for the fifth grade, it was decided to call city-wide meetings of all fifth grade teachers who had access to school radios. This procedure was followed in three school systems: Oklahoma City, El Reno, and Norman. All teachers attending these meetings were promised and given a token payment for their trouble whether they participated or not. The project was explained to these different groups, and they proved rather fruitful sources of recruitment.

All schools in Oklahoma City were using television. Most of the elementary programs were required viewing; however, the viewing of secondary school telecasts generally was left up to the teacher's judgment. The

Director of this project had been the State Director of Educational Television since its inception, and knew most of the schools and teachers who were using instructional television regularly. Hence, the recruitment problem in television was not as great as it was in radio. Each of the schools outside of Oklahoma City, known to be using television, was visited and the project was explained to the teachers who were teaching in subject areas that were being used in the project. The enrollment was always kept on a voluntary basis. In Oklahoma City all of the high schools and junior high schools were checked to see what teachers were using subjects that had been included in the project. With the knowledge and permission of the principals, a building meeting of these teachers was called and the project was explained to them. The teachers were given an opportunity to participate; those who desired to do so were enrolled. A similar procedure was used for the elementary schools of Oklahoma City; since there were so many, only a scattered sampling of the entire City school system was called on. Every effort possible was made to prevent the project from becoming top-heavy with Oklahoma City teachers. However, a larger percentage of Oklahoma City teachers was used than was first intended.

The tabulated responses to the following questions taken from Questionnaire A give a biographical description of the teachers who cooperated in this project. Of the 181 teachers participating, a maximum of 165 responded to one or more items; the least number responding to any item was 117.

4. Which of the following best respresents your current professional education?

   0 Less than a Bachelor Degree
   31 Bachelor's Degree
   33 Ten or more hours beyond the Bachelor's Degree
   50 Master's Degree
   19 Ten or more hours beyond the Master's Degree
   0 Doctor's Degree

5. Sex:
   - 27 Male
   - 96 Female

6. Marital Status:
   - 93 Married
   - 15 Single
   - 10 Widowed
   - 6 Divorced

7. Age:
   - 10 21 to 30
   - 21 31 to 40
   - 43 41 to 50
   - 43 51 to 60
   - 6 61 or over

8. How many years have you used radio as a classroom teaching aid?

9. How many years have you used television as a classroom teaching aid?

TABLE 1.—Previous experience of teachers in use of mass media

Years of Experience	Media	
	Radio	TV
0	17	32
1	6	31
2	6	31
3	7	9
4	9	7
5 or More	32	0
Total[a]	77	110

[a]Some teachers listed experience in both media even though they were using only one for this project.

10. When you first became a user of radio or television, which of the following was primarily responsible for your decision to do so?
    - 61 I became interested in the possibilities of the medium and tried to find programs suitable for my classes.
    - 8 Other teachers told me about programs available, and I decided to try one.
    - 42 My school principal (superintendent or supervisor) suggested that I might find radio or television of value to my classroom.
    - 30 I became interested because of promotional materials mailed by the radio or television station.

11. Having used radio or television in your classroom, which of the following statements now describes best your own feeling about the value of the medium as a teaching aid?

    3 I think it is the greatest invention since printing.
    53 Its value is such that no competent teacher should neglect its use.
    56 It has considerable value to teachers of certain grades or subjects, but it has its limitations in other grades or subjects.
    17 It needs a lot of improvement in planning and production before it can be considered an excellent teaching aid.
    12 I have been only moderately pleased with its value to my own classroom teaching.
    1 I can take it or leave it, but I prefer to leave it.
    1 I think it is of very little value in the classroom.

12. If television (or radio) should become universally available to every classroom, and if a wide range of excellent programs were available under excellent reception conditions, how do you believe such a situation would affect the professional status of teachers?

    63 I think such a situation would tend to enhance the professional prestige of the teacher.
    3 I think it would tend to lower the prestige of teaching.
    53 I doubt if it would have any effect one way or the other on the prestige of teaching.

13. Which of the following statements best describes your usual procedure in the classroom use of radio or television?

    2 It is a pleasant and profitable interlude which requires no particular advance preparation or follow-up activities.
    29 It supplements the basic program and requires a minimum of time for pre-broadcast and after-broadcast activity.
    92 It requires consistent effort both before and after the broadcast in order to insure its effective use.

14. Which of the following statements best describes the extent of in-service training you have had in the classroom use of radio or television? (Check as many blanks as are applicable.)

    43 Other than the training provided by the Title VII grant, I have had no previous in-service training in the use of either radio or television.
    56 I have had a general course in Audio-Visual Education, but no specific training prior to the Title VII Project.

    Prior to the Title VII Project, I had received considerable in-service training in the use of radio or television through:

    15 Personal conferences with a supervisor
    35 Workshop
    41 Use of Printed Materials
    8 (Other) Please Specify_____

15. Which of the following did you use in your classroom?

    51 Radio
    73 Television

17. Which of the following statements best describes the regularity with which you heard the radio or television program in your classroom?

46 I used every program.
42 I missed fewer than 5 broadcasts.
20 I used more than half of the programs.
6 I used about half of the broadcasts in the series.
2 I used less than half of the broadcasts.

18. Which of the following statements best describes your opinion of the possible effect on you and your students of the knowledge that you were participating in a major educational experiment?

75 I believe the students and I both worked harder to use the programs successfully.
2 I think it may have disrupted my use of programs somewhat with a tendency to decrease their effectiveness.
20 I think there was an initial motivating effect which was soon forgotten in so far as students were concerned.
20 I doubt if it had any effect one way or the other.

FACILITIES AND COLLECTION OF DATA

Broadcasting Facilities

The project utilized facilities of Radio Stations WNAD and KOKH. WNAD is the University of Oklahoma station, and operates both AM and FM facilities. The AM is at 640 kilocycles with a power of 1000 watts; the FM is at 90.9 megacycles with an effective radiated power of 7000 watts. KOKH is an FM facility of the Oklahoma City Public Schools, and is at 88.5 megacycles; its effective radiated power is 11000 watts.

Television facilities used were KETA-TV and KOKH-TV. Both stations are owned and operated by the Oklahoma Television Authority, an agency of state government. KETA-TV with studios in both Norman and Oklahoma City operates its Oklahoma City transmitter on Channel 13 with a video power of 74.1 kilowatts effective radiation, and 44.7 kilowatts audio power. The KOSU-TV is a "satellite" station of KETA-TV. Its transmitter is at Sand Springs (the Tulsa suburban area) and has a video ERP of 15 kilowatts with an audio power of 7.5 kilowatts. KOSU-TV receives its programs from Oklahoma City by means of an air pick-up.

Broadcasting Schedule

The radio phase of the study utilized only one series of broadcasts the first year. It was a 15 minute per week broadcast in the field of conservation of natural resources in Oklahoma. The program was written for grades four through seven. Each lesson was broadcast on two days of the week, but at different times during the day. The second broadcast not only

gave the teachers some flexibility as to when they listened but it also made it possible for two teachers to use the same radio for a single program without combining the classes.

The television phase of the experiment encompassed six secondary and two elementary school subjects the first year of the project. Most subjects had telecasts of 30 minutes, but telecasts for some subjects were only 15 minutes in length. Four telecasts per week were made for several of the subjects but for a few subjects only two telecasts per week were made.

The fourth grade social studies telecasts and the telecasts of elementary science were each repeated once. Since each program was broadcast twice, teachers had a choice when they viewed it. Such a practice enabled one television set to serve two classrooms for the same program without combining the classes.

Several changes took place between the first and second years of the project. Some of the changes resulted in severe attrition of the participants, whereas other changes aided in getting replacements.

The radio media used two series of broadcasts the second year whereas only one series was used the first year.

The University of Oklahoma Station, WNAD, replaced the program "Oklahoma Heritage" with "Footsteps of the Free," but continued the same amount of broadcast time as it used the first year. The times of day of the broadcasts were changed to eliminate some schedule conflicts that had been reported by participants.

Radio Station KOKH, and FM station, operated by the Oklahoma City School System, participated in the project the second year. This station broadcast the "Footsteps of the Free" program twice a week on a different time schedule than that of WNAD. KOKH also broadcast another program,

"Cities U. S. A.," for the Oklahoma City fifth grades. This program was rebroadcast three times. Participating fifth grade teachers were allowed to use either program for the project, but they had to make a choice before the tests were sent out.

The changes that had a negative effect on the project were the ones made in the television media.

The telecasting of two high school subjects was discontinued, hence all participating teachers teaching those two subjects were lost to the project. The telecasts of the two grade school subjects were no longer repeated. Consequently, in schools where two teachers were using the same television set to view the same elementary telecast, one of the teachers had to drop out.

The broadcast schedule of the school subjects is presented in Table 2.

Collection of Data

Objective (Questionnaires)

The data collected, in an attempt to get answers to questions 1-a and 1-b, consisted of students' answers to objective tests prepared by the studio teachers and administered by the classroom teachers at the end of the school year. These tests obviously varied in length because the broadcast time for the different classes varied from 15 minutes per week to 30 minutes four times a week. Uniform instructions for giving and taking the tests accompanied each test. Tests in areas involving large numbers of students were machine scored. Tests taken by a relatively small number of students were scored by hand.

The reliability of the tests was calculated by using the odd-even split-half method utilizing the Spearman-Brown formula in order to obtain the coefficient of reliability for the full test.

TABLE 2.—Broadcast schedules and grade levels of school subjects

Subject	Grade level	Broadcasts			
		1959-1960		1960-1961	
		Length in Min.	Number per Wk.	Length in Min.	Number per Wk.
Radio					
Oklahoma Heritage[a]	4-7	15	1	00	0
Footsteps of the Free[b]	4-7	00	0	15	1
Cities U. S. A.[b]	5	00	0	15	1
Television					
Chemistry	10-12	30	4	30	4
Algebra	9-10	30	4	00	0
U. S. History	11-12	30	4	30	4
Physics	11-12	30	4	30	4
High School Math	9-10	30	4	00	0
Oklahoma History	9	30	2	30	2
Social Studies[c]	4	30	2	30	2
Elementary Science[c]	4-6	15	2	15	1

[a]Each lesson was rebroadcast once.

[b]Each lesson was rebroadcast three times.

[c]These lessons were not rebroadcast in 1960-61.

Subjective (Test Scores)

Answers to questions 2-a, 2-b, and 3 were sought by means of four questionnaires. Questionnaire A was mailed toward the end of the first year of the project; Questionnaire B was circulated early in the spring of the second year of the study, and Questionnaire D was mailed near the close of the second school year. Questionnaire C was filled out at a one-day evaluative conference toward the end of the project. Data from these questionnaires not only served as bases for the answers to questions 2-a, 2-b, and 3, but also furnished considerable related data of value to the field of in-service education.

To insure uninhibited answers, all questionnaires were to be returned unsigned.

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

Objective Data

1-a. To what extent is the effectiveness of in-school radio increased by the provision of one or more of the four selected methods of in-service education - workshop, visitation, printed-material, and sound tape - for the participating teachers?

1-b. To what extent is the effectiveness of in-school television increased by the provision of one or more of the four selected methods of in-service education - workshop, visitation, printed-material, and a sound film[1] - for the participating teachers?

The data collected in reference to the above questions consist of test scores made by students in selected subject areas taught by participating teachers in cooperation with radio and television broadcasts. These data make up the objective phase of this study and are dealt with in the next several tables.

The Initial Radio Experiment

For the first radio study, a 2^4 factorial design was employed. There were two levels (some and none) of each of four factors: workshop (w) vs. no workshop (w_0), visitation (v) vs. no visitation (v_0), printed-material (p) vs. no printed-material (p_0), and tape (t) vs. no tape (t_0). Hereafter, these factors will be referred to as w, w_0, v, v_0, etc. This procedure

[1]The film was not completed in time to be used the first year. A number of in-service education telecasts consisting of talks, discussions, and demonstrations were used as a substitute.

TABLE 3.—Number of classes in each cell per media at the close of each testing period and the methods of in-service education applied within each cell.

Cell	Number of Classes				Methods Applied Within each Cell
	1959-1960		1960-1961		
	Radio	TV	Radio	TV	
1	3	5	5	5	None
2	3	5	5	5	V
3	3	5	5	5	V, P-M
4	2	5	5	5	P-M
5	2	5	4	5	T or F
6	3	5	5	5	P-M, T or F
7	3	5	5	4	V, T
8	3	5	5	5	V, P-M, T or F
9	3	5	5	5	W
10	2	5	5	5	V, W
11	3	5	5	5	P-M, W
12	3	5	5	4	T or F, W
13	3	5	5	5	V, P-M, W
14	3	5	5	5	V, T or F, W
15	3	5	5	5	P-M, T or F, W
16	3	5	5	5	P-M, T or F, V, W

yielded 16 different experimental conditions. The dependent variable (outcome criterion) was the class mean score on a non-standardized test administered to 45 different classes in grades 4-6. Six classes had been assigned randomly to each of the 16 experimental conditions, but as many as three of these dropped out of some of the cells, and four were lost to three cells before the test was administered (see Table 3). The factorial design and the 45 resulting class means are shown in Table 4, where w_0 is "no workshop" and w is "workshop."

A complete analysis of variance, shown in Table 5, was made using the procedure for missing entries set forth by Johnson and Jackson.[1] No F-ratio reached the .05 level of significance. The largest F was 2.58, with 1 and 29 d.f., for tape vs. no-tape with means of 18.14 and 15.96, respectively. Other means were: workshop vs. no workshop, 17.475 and 16.625; printed-material vs. no printed material, 17.425 and 16.674; and visitation vs. no visitation, 17.69 and 16.41.

In each of the four instances, presence of the factor had a mean higher than the mean for absence of the factor. This suggests that real differences favoring the factors might exist but fail to manifest themselves significantly because of inadequate power of the significance tests based upon only 1 and 29 d.f. Variability within experimental conditions - that is, among classes "treated alike" with respect to the four experimental variables - is so great that it overpowers variability between experimental conditions. An illustration of this is the $w_0v_0p_0t_0$ cell of Table 4, with its entries of 23.5, 11.7, and 13.6. The 23.5 is the fourth largest of the 45 means, while the 11.7 is the fourth smallest.

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[1]Johnson, Palmer O., and Jackson, Robert W. B., Modern Statistical Methods, pp. 242-243. Chicago: Rand McNally, 1959.

TABLE 4.—Table of means for first radio experiment

w_0								w							
v_0				v				v_0				v			
p_0		p		p_0		p		p_0		p		p_0		p	
t_0	t	t_0	t	t_0	t	t_0	t	t_0	t	t_0	t	t_0	t	t_0	t
23.5	13.8	10.3	15.1	14.7	20.1	18.2	17.9	13.6	19.3	21.6	8.1	14.5	13.7	10.9	21.9
11.7	14.4	11.7	27.6	14.9	20.1	13.6	17.5	24.4	14.2	17.6	20.5	15.5	23.0	17.0	19.4
13.6	(14.1)	(11.0)	15.1	19.7	17.1	23.0	20.2	13.0	16.9	15.6	27.0	(15.0)	19.5	18.4	19.2
16.3	14.1	11.0	19.3	16.4	19.1	18.3	18.5	17.0	16.8	18.3	18.5	15.0	18.7	15.4	20.1

TABLE 5.—Initial radio experiment analysis of variance

Source of Variation	Degrees of Freedom	Sum of Squares	F
w	1	8.1281	.39
v	1	18.2883	.89
p	1	6.3281	.31
t	1	53.2195	2.58
w x v	1	29.7070	1.44
w x p	1	2.2781	.11
w x t	1	0.0633	.00
v x p	1	0.0070	.00
v x t	1	4.7531	.23
p x t	1	15.5320	.75
w x v x p	1	1.1883	.06
w x v x t	1	23.6531	1.14
w x p x t	1	7.6570	.37
v x p x t	1	27.0281	1.31
w x v x p x t	1	32.5125	1.57
Within cells ("error")	29	599.2750	
Total	44	829.6187	

The results of the analysis of variance do not support the efficacy of any of the four factors investigated, or of any combination of them. On the other hand, it does not prove that they have no effect. They might, in fact, have true effects of small or moderate size that the experiment was not powerful enough to detect.

The Initial Television Experiment

Though the design for the television study was formally equivalent to that of the initial radio study, both being 2^4 factorial designs involving dichotomous variables, the analysis of data was greatly complicated by the fact that school classes participating in this study were at various grade levels and in various subjects. This required that all test scores be standardized and normalized. A sta-eleven scale was chosen to give the overall scores for each test at each grade level a mean of 5 and standard deviation of 2. Then, the mean of all students in a given class was found, based on the sta-eleven scores (see Table 6). These means served as the data upon which the analysis of variance was performed.

Results of the analysis of variance are shown in Table 7.

Only one significant F for the interaction of workshop and visit (w x v) occurred. It must be interpreted with considerable caution because of the possible perturbing effect of the non-balanced distribution of grade levels and academic subjects in the experiment. Another reason why the data must be interpreted with caution is that a considerable number of significance tests made at a given level (say the 5% level) might by chance yield one or more apparently significant F's.

Table 8 shows the four wv means, which suggest that workshops are especially effective when supplemented by visits (or one might say equivalently, visits are especially effective when preceded by workshop experience).

TABLE 6.—Table of means for first television experiment

w_0								w							
v_0				v				v_0				v			
p_0		p		p_0		p		p_0		p		p_0		p	
f_0	f	f_0	f	f_0	f	f_0	f	f_0	f	f_0	f	f_0	f	f_0	f
4.41	5.26	7.07	6.97	4.60	3.91	4.61	6.27	2.70	5.54	5.78	3.67	5.53	6.78	5.11	5.42
3.71	7.27	4.76	5.96	2.68	5.48	3.18	5.57	5.04	3.13	3.61	6.06	4.97	5.91	5.38	4.47
5.93	2.83	4.12	4.89	4.87	4.15	3.27	3.97	4.94	4.34	3.50	4.90	4.58	5.47	6.35	6.30
5.66	3.06	5.91	3.69	5.49	3.00	4.18	4.71	2.79	4.52	5.11	4.96	4.87	4.00	4.80	6.29
6.04	4.79	6.37	5.94	4.00	4.63	4.35	4.04	6.70	3.18	4.87	4.57	6.47	5.66	7.36	4.88
5.15	4.64	5.65	5.49	4.33	4.23	3.92	4.91	4.43	4.14	4.57	4.83	5.28	5.56	5.80	5.47

TABLE 7.—Summary of the analysis of variance

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Workshop (W)	1	.9946	.9946	.68
Visitation (V)	1	.1125	.1125	.08
Printed-Material (P)	1	2.5633	2.5633	1.76
Film (F)	1	.0076	.0076	.01
WxV	1	18.4128	18.4128	12.64[a]
WxP	1	.0396	.0396	.03
WxF	1	.0320	.0320	.02
PxV	1	.6882	.6882	.47
FxV	1	.7528	.7528	.52
FxP	1	.5986	.5986	.41
WxPxV	1	.1411	.1411	.10
WxFxV	1	.7801	.7801	.54
WxFxP	1	.7031	.7031	.48
FxPxV	1	.0550	.0550	.04
WxFxPxV	1	1.1235	1.1235	.77
Within Cells (Error)	54[b]	78.6779	1.4570	
Total	69	105.6827		

[a]Significant beyond the 1% level of confidence

[b]Ten degrees of freedom were subtracted from what normally would be the proper number in order to compensate for the transformations performed on the data.

TABLE 8.—Means showing the statistically significant interaction[a]

	Visits	No Visits
Workshop	5.53 (.48)	4.50 (-.48)
No Workshop	4.35 (-.48)	5.23 (.48)

[a]Each mean is based on an N of 20.

As with the initial radio data, little evidence of benefit accruing from the four factors or combinations of them was found. Again, there is concern about power, even though the analysis of variance "error" term for the television study has 54 d.f., compared with only 29 d.f. for the radio study. The use of various grade levels and academic subjects probably increases "error" variance even more than the extra degrees of freedom improve power.

The Second Radio Experiment

During the second year of the project, the necessary replacements were randomly supplied, and the radio study was continued along lines of the previous year, except that two series were presented instead of just one. This made sta-eleven standardizing by topic necessary, analogous to that done for the initial television data.

Means for the 79 classes are shown in Table 9. One entry for the $w_0v_0p_0t_0$ condition was missing. In its place was put 3.65, the mean of the other four class means for that condition, and 1 d.f. or freedom was deducted from the degrees of freedom for the within-conditions sum of squares.

TABLE 9.—Table of means for second radio experiment

w_0								w							
v_0				v				v_0				v			
p_0		p		p_0		p		p_0		p		p_0		p	
t_0	t	t_0	t	t_0	t	t_0	t	t_0	t	t_0	t	t_0	t	t_0	t
5.65	2.82	3.00	5.23	5.83	8.69	3.63	4.48	5.63	4.90	5.50	4.09	4.46	4.50	5.45	7.52
4.35	2.95	2.91	3.97	5.14	4.64	5.30	6.32	3.19	4.63	5.64	2.47	5.08	5.70	4.34	5.48
6.69	7.35	4.49	3.97	4.38	5.94	4.09	5.41	3.85	3.00	5.39	4.68	3.67	4.75	5.57	5.03
5.03	3.47	4.21	4.90	5.71	7.19	4.94	6.57	5.04	4.75	3.60	4.78	5.17	8.00	4.92	3.19
8.09	5.92	(3.65)	7.94	3.92	4.95	4.68	7.81	2.30	3.42	2.85	7.56	3.73	5.66	3.04	4.35
5.96	4.50	3.65	5.20	5.00	6.28	4.53	6.12	4.00	4.14	4.60	4.72	4.42	5.72	4.66	5.11

Table 10 shows results of the analysis of variance. Both tapes and visitations are significant at the .05 level. The means are: t, 5.22, and t_0, 4.60; v, 5.23, and v_0, 4.60. The 95% confidence interval for the difference between the means of t and t_0 is 0.01-1.23, or from almost nothing to about 0.6 of a standard deviation on the sta-eleven scale. By comparison, the standard error within conditions in this experiment is the square root of 1.8733, or 1.37, and the standard deviation of the 79 class means is 1.45. If the "true" difference between the t and t_0 means were as much as 1.23, it would probably have great educational importance. On the other hand, if it were as low as 0.01, it would hold no interest for educators. It might be as low as 0.01 or as high as 1.23, with a probability of .95, so evidently the t - t_0 question is not yet clearly answered.

Almost exactly the same analysis applies to v vs. v_0. However, t vs. t_0 comparison is strengthened, because in the first radio study this was by far the largest difference, though not significant there, whereas the v vs. v_0 difference was small in the first experiment. We, therefore, have double reasons for investigating tapes further, but not the same argument for continuing with visitations.

In the first radio study the presence of each of the four factors resulted in a larger mean than did the absence of the factor. This was not true in the second study, where w_0 exceeded w and p_0 exceeded p, though not significantly in either case.

The Second Television Experiment

The second television study followed the pattern of the first, but with fewer subject-matter areas. Table 11 shows the 78 class means (sta-eleven scale) which range in size from 1.58 to 9.06. The lowest category

TABLE 10.—Second radio experiment analysis of variance

Source of Variation	Degrees of Freedom	Sum of Squares	F
w	1	4.6706	2.49
v	1	8.0455	4.29[a]
p	1	.6462	.34
t	1	7.7315	4.13[a]
w x v	1	.0060	.00
w x p	1	2.8994	1.55
w x t	1	.2868	.15
p x v	1	.0973	.05
t x v	1	5.7192	3.05
t x p	1	1.8697	1.00
w x p x v	1	1.9751	1.05
w x t x v	1	.5233	.28
w x t x p	1	5.4654	2.92
t x p x v	1	3.9117	2.09
w x t x p x v	1	1.0975	.59
Within cells ("error")	61	114.2690	
Total	76	159.2142	

[a] $.01 < p < .05$

TABLE 11.—Table of means for second television experiment

w_0								w							
v_0				v				v_0				v			
p_0		p		p_0		p		p_0		p		p_0		p	
f_0	f	f_0	f	f_0	f	f_0	f	f_0	f	f_0	f	f_0	f	f_0	f
4.00	3.70	3.47	3.11	5.66	6.19	3.65	3.06	7.24	4.94	4.61	1.76	4.17	7.50	5.00	5.88
3.93	3.50	6.81	4.35	5.00	5.25	3.00	4.55	3.88	5.18	5.20	6.67	4.89	7.10	5.70	7.34
4.31	3.59	4.10	9.06	5.41	2.85	4.59	5.05	4.38	4.92	4.21	6.40	3.33	5.31	5.29	5.86
3.78	6.97	5.03	4.97	5.58	6.52	4.67	5.11	3.54	4.50	1.58	4.44	4.39	5.70	6.17	5.24
4.14	5.56	4.15	(5.37)	3.48	5.83	6.70	4.86	6.16	5.26	5.89	4.68	4.14	(6.40)	6.11	4.68
4.03	4.66	4.71	5.37	5.03	5.33	4.52	4.53	5.04	4.96	4.30	4.79	4.18	6.40	5.65	5.80

mean is for $w_0v_0p_0f_0$, the highest for w v p_0f. There is great within-category variability.

None of the sources of variation shown in Table 12 are significant at the .05 level. It is notable, however, that "film" is one of the highest sources, thereby continuing the trend shown by "tape" in both radio studies.

The largest, yet still not significant, source of variation in the second television study was the second-order interaction, w x p x v. Because this complex contingency did not loom large in other studies of this project, it was assumed that it represented either random fluctuations or uncontrolled confounding circumstances; therefore, no attempt was made to interpret it.

Based upon the results of these four experiments, only tape and film seem definitely worthy of further study. There was low power for comparisons made, however. In the future it seems advisable to secure one or more well considered covariables at the start of the experiment. Also, it seems highly desirable to conduct experiments within a single grade level and/or academic subject. Replicating the entire experiment at other grade levels and with other experimental categories in these ways may make the statistical tests employed sensitive enough to detect differences of the magnitude one might expect from the limited intensity and duration of the stimuli (factors) employed.

Subjective Data

Question 2-a

Which of the following four methods is most effective for the in-service education of teachers in the utilization of in-school radio: workshop? visitation? printed-material? sound tapes?

TABLE 12.—Second television study analysis of variance

Source of Variation	Degrees of Freedom	Sum of Squares	F
w	1	2.7232	1.47
v	1	3.9962	2.16
p	1	.0005	.00
f	1	6.0061	3.25
w x v	1	1.6994	.92
w x p	1	.0048	.00
w x f	1	.4410	.24
p x v	1	.2576	.14
f x v	1	.2904	.16
f x p	1	.9812	.53
w x p x v	1	6.2720	3.39
w x f x v	1	2.6938	1.46
w x f x p	1	.4743	.26
f x p x v	1	2.7380	1.48
w x f x p x v	1	1.6646	.90
Within cells ("error")	57	105.3641	
Total	72	135.6072	

Question 2-b

Which of the following four methods is most effective for the in-service education of teachers in the utilization of in-school television: workshop? visitation? printed-material? sound film?

These questions encompass an important phase of this study. Answers to these questions yield insight into the development and administration of an effective in-service education program for teachers who use mass media as a regular part of their classroom instruction.

The objectives of this part of the experiment were sought through the administration of the four selected methods of in-service education, the use of questionnaires, and the holding of a one-day evaluative conference.

Questionnaire A[1]

The first effort to evaluate was the use of Questionnaire A near the end of the first year of the project. Among other objectives in using this questionnaire was that of determining the relative effectiveness of the four methods of in-service education as they were being administered for each media.

In the questionnaire just referred to, teachers were asked to list in the order of value the methods of in-service education which they had received. Eight respondents had received all four methods; 27 respondents had received three methods; another 27 had received two methods. Data for the two questions are presented separately, but for convenience of comparison and combination, they were put in the same table.

Tables 13 and 14 contain the results of the responses to these requests.

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[1]See Appendix I

TABLE 13.—Ranks of the four methods of in-service education based upon their value to the teachers who received them under the respective media (N=8)

Media	Method	Weighted Values[a]				No. of Rankings	Total Weighted Values	Weighted Value Ranks
		4	3	2	1			
TV	Workshop[b]	4	0	0	0	4	16	1
	Visitation	0	1	1	2	4	7	4
	Printed-Material	0	2	1	1	4	9	2
	Audio-Visual	0	1	2	1	4	8	3
Radio	Workshop	3	1	0	0	4	15	1
	Visitation	1	1	1	1	4	10	2
	Printed-Material	0	2	1	1	4	9	3
	Audio-Visual	0	0	2	2	4	6	4
Both	Workshop	7	1	0	0	8	31	1
	Visitation	1	2	2	3	8	17	3
	Printed-Material	0	4	2	2	8	18	2
	Audio-Visual	0	1	4	3	8	14	4

[a]The first place rank was assigned a weighted value of four. Each subsequent rank was assigned a weighted value of one less than the rank immediately above it.

[b]This table is read: the four rankings of the workshop method in the television media yielded a weighted value of 16, thereby causing it to rank first in relationship to the other three methods of in-service education for the television media.

TABLE 14.—Rankings of the four methods of in-service education based upon the percentage of first place ranks as to the effectiveness of the method of the teachers receiving each method in random combinations of three and two under the respective media

Media	Method	Teacher Ranks			Ratio	Percent	Percent Rank
		1	2	3			
Random Combinations of Three							
Television	Workshop[a]	9	0	3	9/12	75	1
	Visitation	1	7	6	1/14	8	4
	Printed-Material	3	7	3	3/13	23	3
	Audio-Visual	1	1	1	1/3	33	2
Radio	Workshop	7	2	0	7/9	78	1
	Visitation	2	3	2	2/7	30	2
	Printed-Material	3	7	3	3/13	23	3
	Audio-Visual	1	1	8	1/10	10	4
Both	Workshop	16	2	3	16/21	76	1
	Visitation	3	10	8	3/21	15	3.5
	Printed-Material	6	14	6	6/26	23	2
	Audio-Visual	2	2	9	2/13	15	3.5
Random Combinations of Two							
Television	Workshop	4	2		4/6	67	1.5
	Visitation	1	2		1/3	33	4
	Printed-Material	5	5		5/10	50	3
	Audio-Visual	2	1		2/3	67	1.5
Radio	Workshop	7	1		7/8	88	1
	Visitation	3	2		3/5	60	2
	Printed-Material	4	7		4/11	36	3
	Audio-Visual	1	5		1/6	17	4
Both	Workshop	11	3		11/14	79	1
	Visitation	4	4		4/8	50	2
	Printed-Material	9	12		9/21	43	3
	Audio-Visual	3	6		3/9	33	4

[a]Twelve respondents in the television media received the workshop method in random combinations with two of the other three methods of in-service education. Nine of the twelve (75%) preferred the workshop method to either of the other two methods they were receiving, thereby giving it a rank of one in relation to the other three methods of in-service education for the television media.

All of the teachers in the television media who received the four methods of in-service education ranked the workshop first. The other three methods were close to each other in weighted values but far below the workshop method. For the radio media the workshop was ranked first by three of the four respondents. The other respondent ranked visitation first. No two of the four respondents agreed on the value of the visitation method. None of the respondents ranked either the printed-material or the audio-visual method first. The printed-material method did get ranked second twice in each media.

Data in this table indicate that these eight respondents who had received the four methods of in-service education for a year, valued the workshop service far in excess of any of the other three services. The other three methods were valued relatively equal, particularly was this true when the data for the two media were combined.

Approximately 75% of the respondents who received the workshop as one of three methods of in-service education ranked it first in both media. No other single method approached such a high and persistent percentage of first place ranks.

When the workshop was one of two methods of in-service education, it had to share its first place position in the television media with the audio-visual method. Since only three respondents received the audio-visual services, its high percent was probably due to chance. Such an interpretation is supported by the ranks of the audio-visual method in other tables of comparable data.

The data in Table 14 indicate that the teachers thought the workshop method was more versatile and self-sufficient than any of the other selected methods, yet the relatively large number of second rank votes received by

the visitation and printed-material methods indicate that the respondents thought these methods had important supplementary services to render.

Questionnaire B[1]

Toward the end of the second year of the project Questionnaire B was mailed to all participants. One part of the questionnaire asked the teachers to rank each of the four methods of in-service education on the basis of the methods' relative values, if each method was administered in the most effective manner.

The results of the above part of the questionnaire are presented in Table 13.

The workshop method received twice as many first place rankings as the other three methods combined.

One of the most unusual items in this table is the high ranking of the audio-visual method, particularly for the television media. This rather unexpected development might have been due to the circulation of the sound film on the utilization of television in the classroom during the second year of the project. Throughout the first year of this experiment the audio-visual method of in-service education for the television media was rendered by talks, discussions and demonstrations over television. Many teachers reported that due to conflict of schedule they missed many of these programs.

The other rather unusual situation is the fourth place rank of the printed-material method when the weighted scores for the two media were combined. The workshop was the only method that maintained the same rank throughout the table.

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[1]See Appendix I

TABLE 15.—Ranks of the four methods of in-service education for each and both media based upon the weighted values of individual teacher rankings (N=45)

Media	Method	Weighted Values[a]				No. of Rankings	Total Weighted Values	Weighted Value Ranks
		4	3	2	1			
Television	Workshop[b]	17	3	3	1	24	84	1
	Visitation	0	7	8	9	24	46	4
	Printed-Material	2	6	7	9	24	49	3
	Audio-Visual	5	8	6	5	24	61	2
Radio	Workshop	14	3	3	1	21	72	1
	Visitation	3	11	3	4	21	55	2
	Printed-Material	3	3	7	8	21	43	3
	Audio-Visual	1	4	8	8	21	40	4
Both	Workshop	31	6	6	2	45	156	1
	Visitation	3	18	11	13	45	101	2.5
	Printed-Material	5	9	14	17	45	92	4
	Audio-Visual	6	12	14	13	45	101	2.5

[a]First place rank was assigned a weighted value of four. Each subsequent rank was assigned a weighted value of one less than the rank immediately above it.

[b]This table is read: the 24 rankings of the workshop method in the television media yielded a total weighted value of 84, thereby causing it to rank first in relationship to the other three methods of in-service education for the television media.

The data indicate that the visitation method held more potential for the radio users than the teachers in the television media. This might be due to the fact that the radio programs were not as closely related to specific class subject matter as were the telecasts. Therefore, the teachers recognized the need for help in integrating the radio broadcast into the class curriculum.

The second part of the Questionnaire B asked the teachers to rate each of the four methods of in-service education on the assumption that each of the methods would be administered in the most effective manner. The rating scale used was excellent - 5; superior - 4; good - 3; fair - 2; poor - 1. The responses indicated that some of the teachers confused rating with ranking. Nevertheless, the responses were used.

The results are presented in Table 16.

Since the same number of teachers did not rate each method, the average ratings had to be used to get the relative rank of each method.

This is the first table of ranks where any of the four methods other than the workshop method maintained the same rank for each and both media.

There is a high degree of similarity between the ranks of the four methods when they are ranked on the basis of teachers' rankings (see Table 15) and on the basis of teachers' ratings (see Table 16).

Questionnaire C[1]

Three items in Questionnaire C were concerned with the teachers' rankings of the four supervisory methods when the methods were used singly as an in-service training program (see Table 17). In addition, the supervisory methods were ranked when they were used in combinations of 3's and 2's as in-service training programs (see Table 18).

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[1]See Appendix I

TABLE 16.—Ranks of the four methods of in-service education for each and both media based upon the average weighted ratings of individual teachers (N=78)

Media	Method	Rated Values[a]					No. of Ratings	Total Rated Values	Average Ratings	Average Rating Ranks
		5	4	3	2	1				
Television	Workshop	23	10	1	0	0	34	158	4.6	1.0
	Visitation	6	14	6	3	3	32	113	3.5	3.5
	Printed-Material	3	14	14	2	1	34	118	3.5	3.5
	Audio-Visual	12	8	6	1	1	28	113	4.0	2.0
Radio	Workshop	27	9	3	0	0	39	180	4.6	1.0
	Visitation	13	15	3	4	0	35	142	4.1	2.0
	Printed-Material	15	17	10	2	0	44	177	4.0	3.5
	Audio-Visual	14	11	13	1	0	39	155	4.0	3.5
Both	Workshop	50	19	4	0	0	73	338	4.6	1.0
	Visitation	19	29	9	7	3	67	255	3.8	3.5
	Printed-Material	18	31	24	4	1	78	295	3.8	3.5
	Audio-Visual	26	19	19	2	1	67	268	4.0	2.0

[a]Excellent - 5; Superior - 4; Good - 3; Fair - 2; Poor - 1

[b]This table is read: the 34 ratings of the workshop method in the television media yielded a total rated value of 158 (an average rating of 4.6) which caused it to rank first in relationship to the other three methods of in-service education for the television media.

TABLE 17.—Ranks of the four methods of in-service education based upon the weighted values of individual teacher rankings under the respective media (N=29)

Media	Method	Weighted Values[a]				No. of Rankings	Weighted Values	Weighted Value Ranks
		4	3	2	1			
Television	Workshop[b]	10	1	4	0	15	51	1
	Visitation	1	8	0	5	14	33	3
	Printed-Material	3	1	4	7	15	30	4
	Audio-Visual	1	5	6	3	15	34	2
Radio	Workshop	9	4	1	0	14	50	1
	Visitation	2	3	5	5	15	32	3
	Printed-Material	3	4	4	3	14	35	2
	Audio-Visual	0	3	5	6	14	25	4
Both	Workshop	19	5	5	0	29	101	1
	Visitation	3	11	5	10	29	65	2.5
	Printed-Material	6	5	8	10	29	65	2.5
	Audio-Visual	1	8	11	9	29	59	4

[a]The first place rank was assigned a weighted value of four. Each subsequent rank was assigned a weighted value of one less than the rank immediately above it.

[b]This table is read: the 15 rankings of the workshop method in the television media yielded a total weighted value of 51, thereby causing it to rank first in relationship to the other three methods of in-service education for the television media.

TABLE 18.—Ranks of the four methods of in-service education based upon the weighted individual teacher rankings of their first three and first two choices of the four methods under the respective media (N=29)

Media	Method	Weighted Values[a]			No. of Rankings	Total Weighted Values	Weighted Value Ranks
		3	2	1			
Three Choices							
Television	Workshop[b]	9	1	5	15	34	1
	Visitation	2	9	1	12	25	2
	Printed-Material	3	1	3	7	14	4
	Audio-Visual	1	4	6	11	17	3
Radio	Workshop	10	3	1	14	37	1
	Visitation	1	5	3	9	16	3
	Printed-Material	3	3	5	11	20	2
	Audio-Visual	0	3	5	8	11	4
Both	Workshop	19	4	6	29	71	1
	Visitation	3	14	4	21	41	2
	Printed-Material	6	4	8	18	34	3
	Audio-Visual	1	7	11	19	28	4
Two Choices							
Television	Workshop	9	1		10	19	1
	Visitation	2	9		11	13	2
	Printed-Material	3	2		5	8	3
	Audio-Visual	1	3		4	5	4
Radio	Workshop	8	2		10	18	1
	Visitation	1	5		6	7	3
	Printed-Material	4	4		8	12	2
	Audio-Visual	1	3		4	5	4
Both	Workshop	17	3		20	37	1
	Visitation	3	14		17	20	2.5
	Printed-Material	7	6		13	20	2.5
	Audio-Visual	2	6		8	10	4

[a]The first place rank was assigned a weighted value equal to the number of choices. Each subsequent rank was assigned a weighted value of one less than the rank immediately above it.

[b]The 15 rankings of the workshop method in the television media yielded a total weighted value of 34, thereby causing it to rank one in relationship to the other three methods of in-service education for the television media.

Teachers were asked to rank the four methods in order of preference, if the methods were to be used singly as four separate programs of in-service education. Two thirds of the teachers in each media ranked the workshop method first; it was the only method that held the same rank for each and both media. The greatest variation in rank of the methods between the two media was that of the audio-visual method, being ranked second by television users and fourth by the radio group. When the weighted values of the two media were combined, the audio-visual method ranked fourth and the visitation and printed-material methods were tied for second rank.

The other two questions referred to in the questionnaire asked the teachers to indicate their first, second and third choices, if they could have any three of the four methods, and then to indicate their first and second choices, if they could have only two of the methods. Table 18 contains the results of these two questions.

The workshop was the only method to hold the same rank throughout the six situations. Note that when the teachers had three choices, 19 of them ranked workshop first, four ranked it second and six ranked it third. It was the only method not left out by one or more teachers. However when the choices were reduced to two, nine teachers forfeited the workshop instead of one of the other methods. The audio-visual method ranked fourth in five of the six opportunities. It outranked printed-material by television users in the table of three choices.

Summary

By means of questionnaires, teachers were requested to evaluate the four methods of in-service education (1) as they observed the application of the methods within the project, and (2) on the assumption that each method was administered in the most effective manner. The responses to

the questionnaires were tabulated, analyzed and interpreted.

The workshop was consistently ranked higher than any of the other three methods. Usually the visitation and printed-material methods would vie for second or third rank. Occasionally, the audio-visual method ranked high, but the responses were usually few when this occurred.

Question 3

Which of the four selected methods is most appropriate to each of the several problem areas included in a comprehensive program of in-service education in the utilization of mass media in the classroom?

This question raises probably the most significant problem in the development and administration of an in-service education program for the use of mass media in the classroom. Answers to questions 2-a and 2-b shed much light upon this phase of education, yet only when the answers to question 3, in all of its ramifications are determined will it be possible to develop the most efficient and effective program of in-service education for the utilization of mass media.

The problems conceived to be inherent in the utilization of radio and television in the classroom were grouped into three broad areas:

I. Orientation
   A. Potential and limitations of media
   B. Attitude toward media
   C. Relationship to studio teachers

II. Physical Utilization
   A. Installation and tuning of sets
   B. Physical environment
      1. Seating arrangement
      2. Location to provide optimum reception
      3. Ventilation and lighting

III. Teaching Skills Unique to the Media
   A. Use of study guide and conditioning the pupils for the broadcast
   B. Function of teacher before, during, and after broadcast
   C. Making the necessary adaptations of the broadcasts to the pupils' level and integrating it with the rest of the curriculum

Questionnaire D[1]

The answers to question 3 were sought through the media of Questionnaire D. Questionnaire D was mailed to all participants toward the end of the second year of the study. The results of the returns of the questionnaire are shown in Table 19.

The pooled judgment of the 88 participants who responded to the questionnaire ranked the workshop first as a method of working with the problems of orientation. Two other items of interest in this section of the table are the closeness of the weighted scores of the visitation and audio-visual methods, and the rather wide margin between these scores and the score of the printed-material method which ranked second. The visitation method moved from fourth rank in the orientation area to first rank as a method of coping with the problems of physical utilization. However, the printed-material method ran a close second and the workshop method was a respectable third. In the problem area of teaching skills unique to the media, the printed-material method gained enough points to rank number one followed by the workshop method as a close second. The audio-visual method gained nine points but still ranked fourth leaving the visitation method to rank third.

An analysis of the data of the three areas indicates the teachers were in greater agreement in their first place choices than they were in any of their other choices. However, it should be noted that the selection of the workshop method for first place rank in the area of orientation was with a considerably greater weighted value than was either of the other two first place ranks.

The fact that teachers chose a different method as their first choice for each of the three problem areas indicates that no method as judged by

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[1]See Appendix I

TABLE 19.—Ranks of the four methods of in-service education based upon weighted individual teacher rankings for each of the three problem areas (N=88)

Rank	Methods							
	Workshop[b]		Visitation		Printed-Material		Audio-Visual	
	No. of Rankings	Weighted Values[a]	No. of Rankings	Weighted Values[a]	No. of Rankings	Weighted Values[a]	No. of Rankings	Weighted Values[a]
Problem Area I - Orientation								
1	69	276	6	24	10	40	3	12
2	7	21	14	42	49	147	18	54
3	8	16	29	58	20	40	30	60
4	4	4	39	39	9	9	36	36
Totals	88	317	88	163	88	236	88	164
Weighted Value Rank		1		4		2		3
Problem Area II - Physical Utilization								
1	17	68	39	156	27	108	5	20
2	32	96	17	51	19	57	20	60
3	17	34	18	36	31	62	22	44
4	22	22	14	14	11	11	41	41
Totals	88	220	88	257	88	238	88	165
Weighted Value Rank		3		1		2		4
Problem Area III - Teaching Skills Unique to Media								
1	33	132	7	28	43	172	5	20
2	24	72	25	75	21	63	18	54
3	17	34	22	44	14	28	23	70
4	14	14	34	34	10	10	30	30
Totals	88	252	88	181	88	273	88	174
Weighted Value Rank		2		3		1		4

[a]The first place rank was assigned a weighted value of four. Each subsequent rank was assigned a weighted value of one less than the rank immediately above it.

[b]This table is read: the 88 rankings of the workshop method in the problem area of orientation yielded a weighted value of 317, thereby causing it to rank first in relationship to the other three methods of in-service education for the problem area of orientation.

teachers engaged in this project is equally effective in all areas. According to the distribution of the weighted values in each of the areas, either some of the methods have many common services which they can render with reasonably equal effectiveness, or the problems in a given area are so diverse that they require more than one approach. The two top ranking methods in the area of orientation, the three top ranking methods in the area of physical utilization, and the two top ranking methods in the area of teaching skills unique to the media are cases in point. In other words, either any one of the three top ranking methods in the area of physical utilization can treat with comparable effectiveness the problems in that area, or the problems are so different that the teachers thought they needed all three methods. The relatively large number of first place ranks assigned to the printed-material method probably indicates that many teachers thought it could render many of the same services that the visitation method could render and with equal proficiency.

The question arose as to whether or not teachers who received in-service education placed the same relative values upon the different methods as did they who administered the methods.

The project director was of the opinion that the aforementioned information would be of value to in-service education. Hence, interested supervisors were given the opportunity to respond to the same questionnaire (Questionnaire D) that had been circulated among the participating teachers. Table 20 contains the results of this inquiry.

In analyzing the weighted values of the supervisors, there seemed to be less differentiation in first choices than in the same choices of the teachers. The teachers had a different method rank first in each of the

TABLE 20.—Ranks of the four methods of in-service education based upon weighted individual supervisor rankings for each of the three problem areas (N=7)

Rank	Methods							
	Workshop[b]		Visitation		Printed-Material		Audio-Visual	
	No. of Rankings	Weighted Values[a]	No. of Rankings	Weighted Values[a]	No. of Rankings	Weighted Values[a]	No. of Rankings	Weighted Values[a]
Problem Area I - Orientation								
1	3	12	2	8	0	0	2	8
2	3	9	1	3	3	9	0	0
3	0	0	4	8	1	2	2	4
4	1	1	0	0	3	3	3	3
Totals	7	22	7	19	7	14	7	15
Weighted Value Rank		1		2		4		3
Problem Area II - Physical Utilization								
1	1	4	4	16	0	0	2	8
2	5	15	1	3	1	3	0	0
3	0	0	1	2	4	8	2	4
4	1	1	1	1	2	2	3	3
Totals	7	20	7	22	7	13	7	15
Weighted Value Rank		2		1		4		3
Problem Area III - Teaching Skills Unique to Media								
1	3	12	4	16	0	0	0	0
2	0	0	1	3	3	9	3	9
3	3	6	2	4	0	0	2	4
4	1	1	0	0	4	4	2	2
Totals	7	19	7	23	7	13	7	15
Weighted Value Rank		2		1		4		3

[a]The first place rank was assigned a weighted value of four. Each subsequent rank was assigned a weighted value of one less than the rank immediately above it.

[b]The table is read: the seven rankings of the workshop method in the problem area of orientation yielded a weighted value of 22, thereby causing it to rank first in relationship to the other three methods of in-service education for the problem area of orientation.

problem areas, whereas the supervisors had one method rank first in two areas. Table 21 compares the choices of the two different groups throughout the three problem areas.

To determine if a statistically significant relationship existed between the rankings of methods by supervisors and teachers, the sum of the differences between ranks was calculated. In the problem areas of orientation, physical utilization, and teaching skills unique to the media, the sums of the rank differences squared were eight ($P = 0.625$), six ($P = 0.792$), and 14 ($P = 0.375$), respectively. When these sums of rank differences were checked for statistical significance by use of Olds' Table,[1] none were found to be significant. This suggests that no significant relationship exists between the rankings of methods made by supervisors and teachers with respect to methods.

The problems encompassed in the physical use of radio and television in the classroom have some unique characteristics. Although general principles in solving these problems can be demonstrated at a workshop or in a film, or stated in printed material, each classroom presents individual problems which can best be solved "on location." Hence, it is no surprise that the two groups chose the visitation method to be the most effective method in handling these problems.

Also, the two groups agreed on their first and third ranked methods for orientation, and their second ranked method for teaching skills unique to the media. However, there are several rather striking differences in the ranks assigned by the two groups to certain methods in the table.

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[1]Olds, E. G., 1939, Distributions of sums of squares of rank differences for small numbers of individuals. Ann. Math. Statist., 9, 133-148, and from Olds, E. G. 1949. The 5% significance levels for sums of squares or rank differences and a correction. Ann. Math. Statist., 20, 117-118.

TABLE 21.—Comparative ranks of four methods of in-service education by supervisors and teachers

Methods	Problem Areas					
	Orientation		Physical Utilization		Teaching Skills Unique to Media	
	Ranks		Ranks		Ranks	
	Supervisor (N=7)	Teacher (N=88)	Supervisor (N=7)	Teacher (N=88)	Supervisor (N=7)	Teacher (N=88)
Workshop	1	1	2	3	2	2
Visitation	2	4	1	1	1	3
Printed-Material	4	2	4	2	4	1
Audio-Visual	3	3	3	4	3	4

For example, the supervisors ranked the printed-material method fourth for all three areas whereas the teachers ranked it first for the area of teaching skills unique to the media.

Two rather important tendencies seem to be present in this table. One is that the supervisors tend to up-rank the visitation method and down-rank the printed-material method. The teachers'rankings of these two methods indicate the opposite tendency. These discrepancies in rank of the methods of in-service education might have been due to the different backgrounds of experience in dealing with these methods and the differences in the status of the two groups. Perhaps these supervisors had found that teachers too frequently "file" printed material rather than reading it. Then, too, since visitation is a major activity of most supervisors, they could easily become enamored with its value as a method of in-service education.

On the other hand, many teachers disliked being visited and therefore might have had a tendency to discount visitation as a method of receiving assistance, especially if some rational substitute were available.

The least casual observer - at district, state, or national teachers' meetings - can readily see that teachers are ardent collectors of printed-material. All teachers may not read what they take, but that does not dampen their ardor to take the printed material. Teachers are busy people and appreciate the time flexibility that the use of printed material allows.

The audio-visual method fared less well with the teachers than it did with the supervisors.

Summary

The problems thought to be present in the use of radio and television in the classroom were divided into three broad areas - orientation,

physical utilization, and teaching skills unique to the media. Through the use of questionnaires, teachers and interested supervisors were asked to rank the four methods of in-service education as to the methods' potential effectiveness in coping with the problems in each of the three areas.

The responses to these questionnaires were projected in tables, analyzed and interpreted. The responses of the teachers were also compared with the responses of the supervisors.

The methods selected by the teachers and supervisors as their respective first choices for the areas are as follows:

Area	Teachers	Supervisors
Orientation	Workshop	Workshop
Physical Utilization	Visitation	Visitation
Teaching Skills Unique to the Media	Printed-Material	Visitation

Evaluation of the In-service Education Received

The primary object of this research project was to secure the subjective opinions of certain teachers concerning the relative effectiveness of selected methods of in-service education for teachers in the use of mass media in the classroom. This fact prompted the idea of collecting the opinions of these same teachers also on the basic value of the in-service education which they had received through this project.

Five interrogating statements were included in Questionnaire A requesting the teachers to appraise certain facets of this study. The questions and summaries of the teachers' responses follow.

Question 34 (Questionnaire A)

Briefly describe below the incident or instance that you received assistance from the Title VII Project which you regarded as the most

helpful suggestion or assistance received.

The scope of the responses to this question varied from a specific instance to the total experiences under one of the methods. Some teachers apparently compared methods rather than instances. An attempt was made to allocate the specific instances to the methods which most likely rendered the service. In many cases the source of aid was obvious, although in others it was a matter of judgment. In instances where it could have come from different methods, each of the said methods was tabulated. Consequently, the tabulations will be greater than the instances. As a result of this procedure the workshop yielded 33, visitation 12, printed-material 14, and audio-visual 8 of the instances of assistance related by the respondents.

Question 35 (Questionnaire A)

Briefly describe below the incident or instance that you received the suggestions or "assistance" from the Title VII Project which you considered of least value.

The adverse criticisms were based largely upon two facets, (1) suggestions whose solutions were beyond the direct control of the teacher, and (2) categorical assistance where there was no felt need. Some of the criticisms that seemed more "to the point" were (1) visitation - "no constructive criticism offered," "too late in year to be of any current help," (2) television demonstrations - "Because of time program scheduled, I was able to view only a few of these programs."

Nearly a third of the teachers had no negative comment to make, but they offered such statements as: (1) "All suggestions were valuable; one of my most enjoyable years of teaching." (2) "They all had their merits." "I felt I had profited from each, possibly in a different way, but I

definitely profited."

Incidents of little or no value were mentioned 34 times and were distributed among the four methods as follows: workshop 8, visits 6, printed-material 7, audio-visual 13.

Question 36 (Questionnaire A)

What suggestion or suggestions would you make for the improvement of the in-service education services which you have received in connection with the Title VII Project?

In general these suggestions were summarized well with the expression, "More of same." However, there were a few such expressions as: (1) "Make tapes and written materials more brief and "to the point," (2) "We need material to help teach, as we do not have time to hunt it," (3) "Help teachers with reference lists for research to be done by children," (4) "Make visits early in the year. Offer constructive criticisms whenever appropriate," (5) "Broadcast in-service education programs when concerned teachers are free to view them."

Question 37 (Questionnaire A)

What value or values (if any) do you see as a probable result of this study of The Relative Effectiveness of Selected Approaches to the In-service Education of Teachers in the Utilization of In-school Radio and Television Broadcasts?

The four most likely results expressed by the respondents were: (1) increased realization of the importance of radio and television as media of instruction, (2) wider use of radio and television in the classroom, (3) better utilization of existing programs on the air, and (4) provision for a permanent program of special training in this area.

The most typical answers to this query were: (1) "It will cause more teachers to realize the importance of additional media for increasing the effectiveness of teaching all children," (2) "It will be an aid in setting up the program on a statewide and/or national basis," (3) "I feel that this is the start of larger things in this field. Its possibilities were clearly demonstrated," (4) "It helps dispel fears of teacher replacement by television," (5) "It will help both administrators and classroom teachers to see the wide possibilities of television teaching when used wisely in the schoolroom," (6) "I believe teachers need special training in presenting this kind of teaching because it is different from classroom teaching. The suggestions and information I received helped me to be more efficient," (7) "It may lead to a 'special methods' class in teacher training."

Question 38 (Questionnaire A)

Use the space below for any additional evaluative comments you care to make on your experience to date as a participant in one of the sub-groups of the experimental group for the Title VII Project.

Among the responses to this request the following were typical. (1) "We were stimulated to do research for more information." (2) "My experience with this project made me a stronger teacher. New ideas were introduced." (3) "Television is an effective educational tool <u>only</u> after you have learned how to use it properly." (4) "More teachers should have access to workshops and principals should create a greater desire for them." (5) "Made use of radio more valuable to me. I had discarded it in favor of television." (6) "I like the use of television much better than radio. I am using television this year with greater results." (7) "A definitely helpful experience in which I learned to

use television as a valuable teaching tool." (8) "A wonderful program."

First Workshop

Teachers were asked to list in order of value, two or more phases of the first workshop. Seventy-one teachers responded to the request, listing nine different activities of the workshop. The order of the frequency of response was as follows:

1.	Importance of classroom teacher	18
2.	Role of radio and television in classroom	17
3.	Speakers	16
4.	Demonstrations and exhibits	13
5.	Group discussions	10
6.	Technical information	7
7.	Explanation of project	7
8.	Teamwork	6
9.	Increased stimulation	5

Those teachers attending the workshop were also asked what phases of the workshop should have been eliminated. The majority made no suggestions; other responses were confined, for the most part, to suggestions of change or elimination of certain mechanics of the workshop. Content was not challenged, except for three suggestions that a promotional talk on the classroom use of television, and a discussion of certain administrative problems be eliminated. (However, one teacher wrote, "I came with an indifferent attitude, but am leaving a converted television classroom teacher.") Suggested changes regarding the mechanics of the workshop are generally illustrated by the following:

1. Eliminate what was felt to be repetitious information by the speakers.

2. Eliminate orientation and detailed preliminaries.

3. Eliminate group discussions using teachers as group leaders. Teachers attending the first workshop were told that they would be invited to another workshop during the term of the project, and they were asked to suggest items for presentation. The most frequent suggestion was for a demonstration of the classroom situation before, during, and following the broadcast. Most other suggestions dealt with one or two of the three phases of the classroom-broadcast situation, lending support to the majority suggestion.

The suggestions, in general, seemed to indicate a felt need for assistance regarding the whole structure of in-school broadcasts, and not simply a need for content material. The method of approach to the problem of in-school broadcasts by an "expert" classroom teacher seemed to be a focus of interest. This interest may have indicated a low felt level of general competency toward these educational media and a willingness to be guided by "so-called experts" in the most fundamental aspects of the technique. However, some teachers may use a demonstration by an "expert" as a standard to measure the effectiveness of their own efforts.

There were random suggestions such as: (1) more printed-material, (2) more time given to smaller groups, (3) have the teacher-manual and discuss, (4) more visual aids, etc. These suggestions were taken into consideration in planning the second workshop.

There was an attempt to evaluate the first workshop in terms of teacher acceptance. Teachers who attended the workshop were asked to give a brief and "to the point" overall evaluation of the workshop. To remove any inhibitions a teacher might have in writing a frank evaluation, they were asked not to sign their evaluation sheets. Responses varied and included the usual, "no comment," and reactions that were contradictory.

Most responses were favorable and expressed an appreciation for the stimulation of interest in radio and television teaching. Some criticism, such as "too little time," was taken to be an inverse expression of approval of the workshop. Grouping of the teachers was criticized by a few who felt that a preponderance of Oklahoma City teachers tended to localize the problem areas under discussion. Following are some representative responses:

1. "This workshop was very profitable from the standpoint of instruction and inspiration."
2. "Considering short notice - quite good - hoping that next one eliminates some of the confusion. Definite grouping - too much time spent on personal gripes; heard several comments that in too many cases, Oklahoma City teachers monopolized conversation on personal problems."
3. "The workshop has helped in bringing about a knowledge that the television is a powerful means of communication; to go back to the radio will give needed skills in listening for audio rather than audio-visual."
4. "All workshops are a motivation to the teacher, so I feel they are worth while..."

Second Workshop

The Kropp-Verner[1] attitude scale was used to evaluate a three-day workshop attended by 36 teachers using television and 37 using radio. The lowest value measured by the scale is 10.89 and the highest is 1.3. The median scale score for the television group was 3.36 with a semi-interquartile range of .55; the median score for the radio group was 3.32

[1]See Appendix III

with a semi-interquartile range of .54.

Evaluative Comments

The following quotations were taken from teachers' letters voluntarily sent to the project office near the end of the experiment.

"In the demonstrations given at the workshop by a group of fifth grade children, many interesting and effective teaching techniques were in evidence throughout the presentation."

"At the workshop many helpful suggestions were made by the supervisors present. A discussion on materials available and how they might be used provided useful information for those teaching both by radio and television."

"The workshop was wonderful. I enjoyed every minute of it. Something was going on all the time, but in a relaxed manner so that we didn't feel pushed."

"I had used radio before in my teaching but not as effectively as with the help you gave us in the in-service training program. Your visits were most enjoyable. They helped us by inspiring and encouraging me to do a better job. The children talked for months about your visit and suggestions that you made. The tapes were excellent also."

"Your suggestions in placing our equipment for better lighting facilities helped a great deal."

"I liked the printed-material method because it saved me work and gave me something to have at hand any time."

"Personally, I find the printed materials much more usable than tapes. It is not always convenient to get and use the tape recorder. There is only one in our building."

"The printed materials were most effective. They were well written and presented basic suggestions concerning the use of radio in the classroom, as well as specific material on the lessons to be presented. It saved hours of research on my part, as well as giving me suggestions and ideas about assignments and follow-up on the programs."

"I was truly impressed with the film 'Television in the Classroom.' I learned a great deal from this film that I did not know before. This film is a valuable teaching tool that every teacher needs."

"The tapes by Mrs. Tucker were very interesting and gave me new ideas on how to present material."

"I really appreciate all the help I received the last two years, and I hope it continues. We will really miss something if it doesn't continue."

"It has helped me to organize my work better. Information received saved us from much extra research."

"I have felt since working with the Title VII Project that I have been more interested in the lessons, developed more skills in listening and realized better what I was trying to accomplish."

Comparative Percentages of Teachers Experiencing Significant Problems

Items 19-31 in Questionnaire A, circulated in the spring of 1960, stated a number of problems which teachers might experience in the use of mass media in the classroom. Teachers were asked to rate the problems according to significance as they had experienced them. One hundred sixteen teachers responded to these items in Questionnaire A - 50 who used radio and 66 who used television.

About a year later 32 teachers were randomly selected to attend a conference to evaluate the project. Twenty-nine of these teachers attended the conference and filled out Questionnaire C which also contained the same items and instructions just referred to. Of the 29 teachers who filled out Questionnaire C, 14 used radio and 15 used television.

The following table contains the problems mentioned above and the percentages of teachers in both radio and television who rated the problems important, very important, or extremely important. The percentages in column A were figured from data in Questionnaire A and the percentages in column C were calculated from data in Questionnaire C. The reduction in the percentages of frequency of the problems might indicate that certain teachers had been helped by the in-service education program administered through this project.

The data in the following table indicate some significant situations.

1. Certain mass media problems are experienced by a greater percentage of radio users than by teachers using television.

TABLE 22.—Comparative percentages of teachers who had difficulty with related problems in the use of radio or television as recorded in Questionnaires A and C

Problem	Media	Per Cent A	Per Cent C
19. Inadequate receiver, set is of poor quality or needs repairs	Radio	54	57
	TV	28	13
20. Faulty installation of receiver; set needs outside antenna or other adaptations to decrease interference, fading, etc.	Radio	50	50
	TV	34	13
21. Room unsuitable for listening or viewing; seating arrangement is poor, there is faulty ventilation, poor lighting, or other problems which detract from children's attention to the program	Radio	30	21
	TV	36	26
22. Maintaining appropriate level of pupil interest throughout the broadcast	Radio	54	57
	TV	46	33
23. Insufficient time to use the broadcasts and accomplish other necessary teaching activities	Radio	57	50
	TV	60	40
24. Adapting the subject matter of broadcasts to the subject matter of the grade or class for which the series is used	Radio	53	42
	TV	46	20
25. Adapting the level of difficulty of the broadcasts to the grade level of students using the broadcasts	Radio	44	50
	TV	46	13
26. Unfavorable attitude of teaching colleagues toward the use of radio or television in this school.	Radio	24	21
	TV	28	7
27. Unfavorable attitude of principal, supervisor, or superintendent toward use of the broadcasts in my classroom	Radio	8	21
	TV	17	0
28. Lack of suitable printed materials and program announcements for advance planning of classroom use of radio or television	Radio	30	15
	TV	26	13
29. Adapting the classroom schedule to the broadcast time of programs on radio or television	Radio	44	36
	TV	58	26
30. Inadequate time for proper pre-broadcast preparation of students in the classroom for optimum motivation and meaning of the listening or viewing experience	Radio	51	72
	TV	64	33
31. Lack of time after the broadcast to permit follow-up activities necessary to appropriate usefulness of the program used	Radio	48	76
	TV	67	33

2. Most of the problems are common to the two media.
3. The teachers using television appear to be getting their problems solved more rapidly than do the teachers using the radio media.
4. Several of the problems are interrelated. For example, so long as problems 19 and 20 are present, item 22 will remain a problem.

Items 22, 23, 24, 25, 30, and 31 present a galaxy of problems for users of either media and should challenge the best minds of the producers of the broadcasts, of the administrative and supervisory staffs of the various school systems, and of the classroom teachers using the media.

Of the 29 teachers in attendance at the evaluative conference, 11 indicated they had received help with from one to four of the above problems. Five were the most teachers who indicated that they had received help with any one problem. No one recorded that they had received any assistance with problems numbered 2, 26, 27, and 30. It should be noted that problems 26 and 27 were seldom significant, hence, the opportunities to assist were less frequent.

Even though 27 of the 29 teachers who filled out Questionnaire C indicated that they had felt a need for assistance in the use of radio and television before the project started, the same 27 responded that they were much more aware of the problems involved in the use of radio and television after the project than before.

In short, an attempt was made by means of questionnaires and teachers' spontaneous opinions expressed in letters to get a subjective evaluation of the in-service education rendered through this project. The teachers made a few adverse criticisms, but in general they thought the in-service education which they had received was very much worth while.

SUMMARY

The general purpose of the study was to determine the effectiveness of selected methods of in-service education in the use of mass media - radio and television - in the classroom. More specifically, answers to the three following questions were sought through this project.

1. To what extent is the effectiveness of in-school mass media increased by the provision of selected methods of in-service education - workshop, visitation, printed-material, and audio-visual - for the participating teachers?
2. Which one of the four supervisory methods stated in question 1 is the most effective for the in-service education of teachers in the use of mass media in the classroom?
3. Which one of the four selected methods stated in question 1 is most appropriate to each of several problem areas included in a comprehensive program of in-service education in the use of mass media in the classroom?

The in-service education programs were planned to render assistance to teachers who had problems in the broad areas - orientation, physical utilization, and teaching skills unique to the respective media - whether the teachers were experienced or inexperienced in this phase of teaching.

In general, all methods were applied to the same types of problems in the manner most appropriate to the methods available to the teachers concerned. The printed-material method and the sound-tape method used for the media of radio included a limited amount of supplementary material.

This service was not provided for the television media because there were too many subject matter areas with which to cope. Then, too, the telecasts were more closely associated with the local text books and curricula than were the radio broadcasts.

The samples for the project were randomly selected from the teachers and pupils who were listening to certain radio broadcasts or viewing certain telecasts, and who were willing to participate in the experiment. There was one control cell and fifteen experimental cells for each media. The cells for each media were assumed to be equal in student ability as well as in teaching ability. The data collected from each class consisted of raw scores made on objective subject-matter tests prepared by studio teachers and administered by classroom teachers at the end of each school year.

A 2^4 factorial design was employed to test for the effects of interaction among the four variables (methods).

The class means of the raw scores were used to perform the analysis of variance for the first radio experiment because only one broadcast series was used. However, in the second radio experiment and both television experiments, more than one broadcast series was used; hence, the raw scores were standardized and normalized. A sta-eleven scale was chosen to give the over all scores for each test at each grade level a mean of 5 and a standard deviation of 2. Then, the mean of the sta-eleven scores of all students in a given class was found. These means served as the data upon which the analyses of variances were performed for these three experiments.

The results of the analyses of variances did not support the efficacy of any one of the four factors (methods) investigated, or any combination

of them. On the other hand, the results did not prove that the methods had no effect. There were, in fact, certain evidences in the form of teachers' subjective opinions which definitely indicated that the in-service education programs as administered were very beneficial to the teachers, hence, to their pupils also.

If the teachers were qualified to evaluate the services they had received, the following appear to be valid assumptions:

1. the testing instruments may have lacked the necessary power to detect the true effects of the methods.
2. (and/or) the variability within experimental conditions - that is, among classes "treated alike" with respect to the four experimental variables - was so great that it overpowered the variability between the experimental conditions.
3. (and/or) the testing instruments failed to test for all of the services rendered.

Answers to questions 2 and 3 (in the summary) were sought by means of questionnaires which contained requests for the teachers' subjective opinions about the relative effectiveness of the workshop, visitation, printed-material, and audio-visual methods of in-service education for general purpose and for particular problem areas. The results of the questionnaires were tabulated, analyzed, and interpreted.

The results of the data collected in answer to summary question 2 - which one of the four supervisory methods stated in summary question 1 is the most effective for the in-service education of teachers in the use of mass media in the classroom - indicated that the teachers had a decided preference for the workshop method.

Although there seemed to be no doubt about the teachers' first choice, their other choices varied considerably. In general, however, data

indicated that the visitation and printed-material methods oscillated between second and third choices. Usually the times that the audio-visual methods ranked high, the number of responses were quite limited.

There did not seem to be any consistent difference between the choices for the radio media and for the television media.

The prevalence of the workshop as a first choice method of in-service education probably indicates that it can render effectively more diversified services than any other of the selected methods. Equally true does the lack of consistency in the ranks of other choices indicate that they may be looked upon as more specialized or limited in scope of service than that of the workshop.

The responses to question 3 - which one of the four selected methods stated in summary question 1 is most appropriate to each of several problem areas included in a comprehensive program of in-service education in the use of mass media in the classroom - showed that teachers recognized the need for a diversified in-service training program.

For problems in the area of orientation the workshop method ranked first, but for problems in the area of physical utilization the teachers showed a preference for the visitation method. Apparently, the problems involved in developing teaching skills unique to the media require still a different type of service for here the teachers ranked the printed-material method first.

However, further analysis of the data suggested the following as a comprehensive in-service education program for the respective areas.

1. For problems of orientation the workshop method supplemented by the printed-material method

2. For problems of physical utilization, the visitation and/or printed-material method supplemented by the workshop method
3. For problems of teaching skills unique to the media, the printed-material method, extensively supplemented by the workshop method and further supplemented with limited visitation.

Audio-visual aids such as tapes, slides, and films would be necessary adjuncts to the above methods.

RECOMMENDATIONS FOR FURTHER RESEARCH

On the basis of the results of this investigation the following recommendations for further study regarding in-service education for teachers who use mass media in the classroom are suggested.

1. Shift from the general framework of this project - dual media, multi-county, inter-school system, multiple graded - to a much more tightly controlled design utilizing one medium (television) and involving a single school subject and a single grade level throughout a major school system.

   Although this recommendation considerably restricts the field of experimentation, it should effect major improvements in the statistical reliability of the data.

2. At the outset of the experiment, it would be desirable to use appropriate covariables which would substantially correlate with the dependent variable - criterion class mean - and utilize the analysis of covariance technique.

3. The respective services should be applied with much greater intensity than was practical in this experiment.

4. Develop testing instruments that would encompass the services rendered.

APPENDIX I

Title VII Project
Form 6-60

Questionnaire A

TEACHER APPRAISAL OF TITLE VII PROJECT

To the Teacher:

During the 1959-60 school year, you gave your cooperation to a major research project sponsored by the Educational Broadcasting Services of the University of Oklahoma under a grant from the U. S. Office of Education's Title VII Program of the National Defense Education Act. This project is designed to study The Relative Effectiveness of Selected Approaches to the In-Service Education of Teachers in the Utilization of In-School Radio and Television Broadcasts.

In addition to the collection and statistical analysis of objective data, it is important to obtain the expert subjective appraisal of each teacher involved in the project. Since you have participated either in one of the experimental sub-groups or in the control group for the project, your response to this questionnaire is of considerable importance.

Please complete each question unless it obviously is not applicable to you or to your situation. DO NOT SIGN the questionnaire form. The research team is interested in what is said, not in who said it. There are no hidden "gimmicks" or numbering devices to identify your response.

When you have completed your questionnaire, please mail it in the self-addressed business reply envelope enclosed for your convenience. Please check and mail to us separately the business reply card which also is enclosed. In this way, we can avoid mailing unnecessary follow-up reminders to this questionnaire.

Please accept our sincere thanks for your continued assistance and cooperation in the project and for providing us with a frank appraisal of the project to date.

Sincerely yours,

M. W. Glasgow, Director
Title VII Project
Extension Division
University of Oklahoma
Norman, Oklahoma

MWG/jb

Title VII Project
Form 6-60

Check One

_____Experimental Group

_____Control Group

TEACHER APPRAISAL OF TITLE VII PROJECT

Part I

The following questions are designed to give a picture of the general characteristics of teachers responding to this questionnaire and their prior experience with classroom use of radio or television. Please check the appropriate spaces or complete the blanks as indicated. Please check only one blank for each question.

1. How many years have you taught?_____

2. How many years had you taught in your 1959-60 position?_____

3. What grade (s) or subject (s) did you teach during the 1959-60 school year?_____.

4. Which of the following best represents your current professional education?

_____Less than a Bachelor Degree

_____Bachelor's Degree

_____Ten or more hours beyond the Bachelor's Degree

_____Master's Degree

_____Ten or more hours beyond the Master's Degree

_____Doctor's Degree

5. Sex:

_____Male

_____Female

6. Marital Status:

_____Married

_____Single

_____Widowed

_____Divorced

7. Age:

_____21 to 30

_____31 to 40

_____41 to 50

_____51 to 60

_____61 or over

8. How many years have you used radio as a classroom teaching aid?

_____years.

9. How many years have you used television as a classroom teaching aid?

_____years.

10. When you first became a user of radio or television, which of the following was primarily responsible for your decision to do so?

_____I became interested in the possibilities of the medium and tried to find programs suitable for my classes.

_____Other teachers told me about programs available and I decided to try one.

_____My school principal (superintendent or supervisor) suggested that I might find radio or television of value to my classroom.

_____I became interested because of promotional materials mailed by the radio or television station.

11. Having used radio or television in your classroom, which of the following statements now describes best your own feeling about the value of the medium as a teaching aid.

_____I think it is the greatest invention since printing.

_____Its value is such that no competent teacher should neglect its use.

_____It has considerable value to teachers of certain grades or subjects, but it has its limitations in other grades or subjects.

_____It needs a lot of improvement in planning and production before it can be considered an excellent teaching aid.

_____I have been only moderately pleased with its value to my own classroom teaching.

_____I can take it or leave it, but I prefer to leave it.

_____I think it is of very little value in the classroom.

12. If television (or radio) should become universally available to every classroom, and if a wide range of excellent programs were available under excellent reception conditions, how do you believe such a situation would affect the professional status of teachers?

_____I think such a situation would tend to enhance the professional prestige of the teacher.

_____I think it would tend to lower the prestige of teaching.

_____I doubt if it would have any effect one way or the other on the prestige of teaching.

13. Which of the following statements best describe your usual procedure in the classroom use of radio or television?

_____It is a pleasant and profitable interlude which requires no particular advanced preparation or follow-up activities.

_____It supplements the basic program and requires a minimum of time for pre-broadcast and after-broadcast activity.

_____It requires consistent effort both before and after the broadcast in order to insure its effective use.

14. Which of the following statements best describe the extent of in-service training you have had in the classroom use of radio or television? (Check as many blanks as are applicable)

_____Other than the training provided by the Title VII grant, I have had no previous in-service training in the use of either radio or television.

_____I have had a general course in Audio-Visual Education, but no specific training prior to the Title VII Project.

Prior to the Title VII Project I had received considerable in-service training in the use of radio or television through:

_____Personal conferences with a supervisor

_____Workshop

_____Use of Printed Materials

_____(Other) Please Specify_____

Part II

The following questions are designed to assist you in making a subjective appraisal of the in-service training you have received as a part of the Title VII Project. Teachers in each of the experimental sub-groups will have received one or more of these supervisory services. Teachers in the control group have not received any of the in-service training services. After responding to questions 15 through 33, teachers in the control group will omit the remainder of Part II.

15. Which of the following did you use in your classroom?

_____Radio

_____Television

16. Check any of the following series which you used in your classroom.

Television

_____ _____

_____ _____

_____ _____

Radio

_____ OKLAHOMA HERITAGE

17. Which of the following statements best describes the regularity with which you heard the radio or television program in your classroom?

_____I used every program.

_____I missed fewer than 5 broadcasts.

_____I used more than half of the programs.

_____I used about half of the broadcasts in the series.

_____I used less than half of the broadcasts.

18. Which of the following statements best describes your opinion of the possible effect on you and your students of the knowledge that you were participating in a major educational experiment?

_____I believe the students and I both worked harder to use the programs successfully.

_____I think it may have disrupted my use of programs somewhat with a tendency to decrease their effectiveness.

_____I think there was an initial motivating effect which was soon forgotten in so far as students were concerned.

_____I doubt if it had any effect one way or the other.

Below (items 19-33) are a number of problems which teachers have experienced in the use of radio and television in the classroom. Please rate the importance of each problem to your own teaching situation by circling the appropriate letter on the left of each item.

E - Extremely Important
V - Very Important
I - Important
L - Of Little Importance
S - Seldom, if ever, a problem.

19. E V I L S Inadequate receiver, set is of poor quality or needs repairs.

20. E V I L S Faulty installation of receiver. Set needs outside antenna or other adaptations to decrease interference, fading, etc.

21. E V I L S Room unsuitable for listening or viewing. Seating arrangement is poor, there is faulty ventilation, poor lighting, or other problems which detract from children's attention to the program.

22. E V I L S Maintaining appropriate level of pupil interest throughout the broadcast.

23. E V I L S Insufficient time to use the broadcasts and accomplish other necessary teaching activities.

24. E V I L S Adapting the subject matter of broadcasts to the subject matter of the grade or class for which the series is used.

25. E V I L S Adapting the level of difficulty of the broadcasts to the grade level of students using the broadcasts.

26. E V I L S Unfavorable attitude of teaching colleagues toward the use of radio or television in the school.

27. E V I L S Unfavorable attitude of principal, supervisor, or superintendent toward use of the broadcasts in my classroom.

28. E V I L S Lack of suitable printed materials and program announcements for advance planning of classroom use of radio or television.

29. E V I L S Adapting the classroom schedule to the broadcast time of

programs on radio or television.

30. E V I L S Inadequate time for proper pre-broadcast preparation of students in the classroom for optimum motivation and meaning of the listening or viewing experience.

31. E V I L S Lack of time after the broadcast to permit follow-up activities necessary to appropriate usefulness of the program used.

(If "Control Group" is checked at the top of Page One, you will omit questions 34-39. If "Experimental Group" is checked, continue your response to the end of the Questionnaire.)

32. As a member of one of the 16 experimental sub-groups you received one or more supervisory services (in-service training techniques) during the 1959-60 school year. Check any of the following services which you received:

_____Tapes

_____TV Demonstrations

_____Printed Materials

_____Visits* (Personal Conferences)

_____Workshops

*You may have been visited by one or more of the following people:

M. W. Glasgow, University of Oklahoma
Leon Hibbs, State Department of Education
Elaine Tucker, Vivian Haynes, Georgia Roberts,
Mildred Richard, Oklahoma City Public Schools
Glen Pool, University of Oklahoma

33. If you checked more than one service in question 32, write below the items checked in the order of their relative importance or value to you. List on the first line the service you found to be of most value. Arrange other services received in order of their importance or value to you, placing the service of least importance or value at the bottom of your list. Remember, you are to rate only those services you actually received in your classroom last year as part of the Title VII Project.

_____

_____

_____

_____

_____

34. Briefly describe below the incident or instance in which you received assistance from the Title VII Project which you regarded as the most helpful suggestion or assistance received.

_____

_____

_____

_____

35. Briefly describe below the incident or instance in which you received the suggestion or "assistance" from the Title VII Project which you considered of least value.

_____

_____

_____

_____

36. What suggestion or suggestions would you make for improvement of the in-service training services which you have received in connection with the Title VII Project?

_____

_____

_____

_____

37. What value or values (if any) do you see as a probable result of this study of The Relative Effectiveness of Selected Approaches to the In-Service Education of Teachers in the Utilization of In-School Radio and Television Broadcasts?

_____

_____

_____

_____

38. Use the space below for any additional evaluative comments you care to make on your experience to date as a participant in one of the sub-groups of the experimental group for the Title VII Project.

_____

Thank you very much for completing this important questionnaire. Please mail it in the business reply envelope furnished for your convenience. If you will also mail separately the business reply card, we can avoid sending you an unnecessary reminder in our follow-up mailing to this questionnaire.

National Defense Education Act
Title VII Project
Educational Broadcasting Services
Extension Division
University of Oklahoma
Norman, Oklahoma

Title VII Project

Questionnaire B

Teacher Appraisal of the Four Selected Methods
of In-Service Education

To the Teacher:

Your candid opinion is sought as to the value of the four methods of in-service education being used in this project.

Please fill in the enclosed self-addressed postal card according to the following instructions.

1. Rate and rank the methods for the mass media you are using in cooperation with this study.

2. When you rate the methods, use the following five point scale.
   (5) Excellent (4) Good (3) Fair (2) Poor
   (1) Negligible value

3. Rank the four methods as to their relative values. You should place a (1) under "rank" and opposite your first choice, a (2) opposite your second choice, etc.

Sincerely yours,

M. W. Glasgow, Director
Title VII Project
Extension Division
University of Oklahoma
Norman, Oklahoma

MWG/jb

Postal Card

Rate	Radio	Rank	Rate	Television	Rank
_____	1. Workshop	_____	_____	1. Workshop	_____
_____	2. Visitation	_____	_____	2. Visitation	_____
_____	3. Printed Material	_____	_____	3. Printed Material	_____
_____	4. Tapes	_____	_____	4. Movie with Sound	_____

Title VII Project Questionnaire C

_____Radio Questionnaire for Evaluative Conference Television_____
of Title VII Research Project
University of Oklahoma
Norman, Oklahoma

O. E. A. Building, Oklahoma City, Oklahoma
May 27, 1961

I. Prior to the beginning of this project did you feel any need for in-service training in teaching with radio or television broadcasts?
Yes_____ No_____

II. Below (Items 1-15) are a number of problems which teachers have experienced in the use of radio and television in the classroom. Please rate the importance of each problem to your own teaching situation by circling the appropriate letter on the left of each item.

E - Extremely Important
V - Very Important
I - Important
L - Of Little Importance
S - Seldom, if ever, a problem

1. E V I L S Inadequate receiver, set is of poor quality or needs repairs.

2. E V I L S Faulty installation of receiver. Set needs outside antenna or other adaptations to decrease interference, fading, etc.

3. E V I L S Room unsuitable for listening or viewing. Seating arrangement is poor, there is faulty ventilation, poor lighting, or other problems which detract from children's attention to the program.

4. E V I L S Maintaining appropriate level of pupil interest throughout the broadcast.

5. E V I L S Insufficient time to use the broadcasts and accomplish other necessary teaching activities.

6. E V I L S Adapting the subject matter of broadcasts to the subject matter of the grade or class for which the series is used.

7. E V I L S Adapting the level of difficulty of the broadcasts to the grade level of students using the broadcasts.

8. E V I L S Unfavorable attitude of principal, supervisor, or superintendent toward use of the broadcasts in my classroom.

9. E V I L S Unfavorable attitude of teaching colleagues toward the use of radio or television in this school.

10. E V I L S Lack of suitable printed materials and program announcements for advance planning of classroom use of radio or television.

11. E V I L S Adapting the classroom schedule to the broadcast time of programs on radio or television.

12. E V I L S Inadequate time for proper pre-broadcast preparation of students in the classroom for optimum motivation and meaning of the listening or viewing experience.

13. E V I L S Lack of time after the broadcast to permit follow-up activities necessary to appropriate usefulness of the program used.

14. E V I L S _____

_____

15. E V I L S _____

_____

III. Please check those problems in question 2 with which you feel that you have received some help as a result of this project.

IV. Which of the following statements best describes the extent of in-service training you have had in the classroom use of radio or television? (Check as many blanks as are applicable)

_____Other than the training provided by the Title VII grant, I have had no previous in-service training in the use of either radio or television.

_____I have had a general course in audio-visual education, but no specific training prior to the Title VII Project.

Prior to the Title VII Project I had received considerable in-service training in the use of radio or television through:

_____Personal conferences with a supervisor

_____Workshop

_____Use of Printed Materials

_____(Other) Please Specify_____

V. Are you more conscious of problems involved in the use of radio and television in the classroom now than you were before the project began? Yes_____ No_____

VI. Assuming that the project was well done was the program extensive enough to expect statistically significant differential in the learning of the children in the different categories? Yes_____ No_____

VII. Based upon your training and experience and assuming that each type of service was performed well, how would you rank them as to effectiveness used by themselves as an in-service training program?

Television	Radio
_____Workshop	_____Workshop
_____Visits and Conferences	_____Visits and Conferences
_____Films	_____Tapes
_____Printed Materials	_____Printed Materials

VIII. If you had access to a combination of only two services, which two would you choose?

Television	Radio
_____1.	_____1.
_____2.	_____2.

IX. If you had access to a combination of three, which three would you choose?

Television	Radio
_____1.	_____1.
_____2.	_____2.
_____3.	_____3.

X. If more than one type of service is used should the second one:
_____1. reinforce the first by presenting the same content in a different manner?
_____2. should the two media render different services, each serving in the area where it is most effective?

XI. For an in-service training program in the utilization of radio and television in the classroom to be justified, the least it should do would be to:
_____1. reflect statistically significant improvement in the learning of the pupils under the teacher receiving the services.

_____2. reflect some improvement in the learning of said pupils.

_____3. make the teacher feel more satisfied with the job he is doing.

_____4. make the pupils enjoy the class more even though it has no significant effect upon their learning.

XII. To what extent was your principal concerned about whether or not you used radio or television in your classroom?
Check one:

_____1. Vitally

_____2. Considerably

_____3. Some

_____4. Disinterested

_____5. Rather I wouldn't but wouldn't say I couldn't

XIII. To what extent was your principal of technical assistance to you in using radio or television in the classroom?
Check one:

_____1. A great deal

_____2. Considerable

_____3. Some

_____4. Very little

_____5. None

XIV. To what extent did your principal encourage or stimulate you to use radio or television?
Check one:

_____1. A great deal

_____2. Considerable

_____3. Some

_____4. Very little

_____5. None

XV. Which of the following statements best reflects your feeling as to the responsibility of teachers becoming adequately skilled in the use of radio or television in the classroom?
Check one:

_____1. Teacher acquire said skills on his own time and expense.

_____2. Teacher acquire them on his own time at the expense of the school district.

_____3. Teacher acquire them at his own expense but on school time.

_____4. Teacher acquire them on free time and at school expense.

_____5. Teacher acquire them on his own time but draw extra pay for so doing.

XVI. Which of the following plans to acquire the necessary skills in the use of radio and television do you think is the most practical? Check one:

_____1. Special college course in these particular areas

_____2. Summer workshop for college credit

_____3. As a part of the standard audio-visual program

_____4. As parts of the methods courses offered for the various subjects

Title VII Project Questionnaire D

Questionnaire to Determine the Relative Value of each of the Four Methods of In-service Education when Applied to Separate Broad Problem Areas in the use of Mass Media in the Classroom

The information called for on the enclosed postal card in needed in writing our experiment.

Listed below are three problem areas in which teachers have to become proficient if they are to use radio and television effectively in the classroom. The subheads are merely to make clear what is meant by the main headings.

PROBLEM AREAS IN USING TELEVISION AND RADIO IN THE CLASSROOM

I. Orientation
   A. Potential and limitations of television and radio
   B. Attitude toward television and radio
   C. Relationship to studio teachers

II. Physical utilization
   A. Installation and tuning of sets
   B. Physical environment
      1. Seating arrangement
      2. Location to provide optimum reception
      3. Ventilation and lighting

III. Teaching skills unique to the media
   A. Use of study guide and conditioning the pupils for the broadcast
   B. Function of teacher during broadcast
   C. Making the necessary adaptation of the broadcasts to the pupils' level and integrating it with the rest of the curriculum.

Let us assume that you are a beginning teacher and need considerable help in each of the three areas just mentioned. Let us further assume that you can get this needed assistance in the following four ways.

*CV. Classroom visits followed at end of day by conferences

PM. Printed materials

SF. Sound film for television
ST. Sound tapes for radio

WS. Workshop

*Each of these four services will be made as effective as possible.

Please indicate on the enclosed postal card the order in which you would choose these services to help you in each of the three problem areas.

Sample

	1st	2nd	3rd	4th
I. Orientation	WS	PM	CV	SF
II. Physical utilization	CV	WS	PM	SF
III. Teaching skills	PM	CV	SF	WS

Sincerely yours,

M. W. Glasgow, Director
Title VII Project

MWG/jb

Enclosure

Postal Card

Please fill in all the blanks as in the "sample" but use your judgment as to which service you indicate under 1st, 2nd, etc.

	1st	2nd	3rd	4th
I. Orientation	____	____	____	____
II. Physical utilization	____	____	____	____
III. Teaching skills	____	____	____	____

APPENDIX II

TABLE 1.—Class means and pupils' raw scores on subject-matter test by classes (T) within cells in the first radio experiment.

	Cell-1			Cell-2			Cell-3			Cell-4		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
M	23.5	11.7	13.6	14.7	14.9	19.7	18.2	13.6	23.0	10.3	11.7	
	27	17	5	13	11	13	28	17	26	8	18	
	19	16	23	17	13	18	17	9	22	11	18	
	19	18	20	15	15	20	16	13	22	13	10	
	24	12	10	16	12	20	5	9	24	10	6	
	19	11	11	15	16	13	24	18	22	6	9	
	24	15	15	13	13	23	19	18	23	3	13	
	26	13	10	11	22	31	18	11	28	12	10	
	28	11	16	14	10	18	13	16	28	9	9	
	21	7	17	19	8	20	17	8	26	10	16	
	18	15	23	10	11	25	23	14	21	11	10	
	15	13	20	14	19	24	21	15	24	8	16	
	14	15	15	13	22	24	19	14	13	3	10	
	31	15	14	7	24	27	16	15	20	10	10	
	33	24	18	15	20	17	19	13	17	15	11	
	21	12	16	17	18	16	13	11	25	25	12	
	25	12	18	13	14	18	14	12	27		9	
	23	15	15	20	16	17	22	19	22			
	30	9	13	21	16	23	19	9	21			
	27	10	12	20	19	17	9	20	27			
	17	8	17	7	8	15	14	6	28			
	26	6	15	14	11	16	17	11	24			
	29	11	9	11	5	17	20	19	18			
	25	11	8	13	11	20	21	12	24			
	26	14	7	14	17		23	15	13			
	23	11	10	18	12		23	20	24			
	24	18	12	4	12		20	20	25			
	27	14	12	14	10		24		23			
	27	15	9	11	7		22		26			
	24	7	19	27	15		17		23			
	25	14	8	14	26		17		25			
	28	8	8	16	23		20					
	28	5	13	19	21		10					
	27	15	9	18	16		19					
	25	6	16	18			23					
	26	8										
	24	5										
	12	3										
	8	7										

TABLE 1—Continued.

	Cell-5			Cell-6			Cell-7			Cell-8		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
M	13.8	14.4		15.1	27.6	15.1	20.1	20.1	17.1	17.9	17.5	20.2
	21	14		12	31	10	22	22	21	22	13	16
	8	16		19	27	19	25	9	22	27	15	23
	5	11		19	20	9	25	14	15	25	19	24
	16	21		25	27	12	17	16	21	18	23	12
	10	14		14	31	6	24	12	19	19	14	21
	16	15		10	27	15	21	15	21	15	13	24
	23	20		22	27	7	18	18	13	16	21	11
	6	17		9	25	8	18	20	13	20	15	14
	12	4		14	32	16	20	21	21	21	21	18
	18	7		13	28	13	22	16	20	20	19	22
	18	19		17	22	15	17	17	17	22	16	20
	5	11		21	33	6	22	14	23	20	16	25
	4	18		10	31	9	20	15	18	19	16	16
	17	15		13	24	22	22	23	23	14	15	18
	10	23		13	25	13	16	23	13	17	12	19
	22	16		10	33	22	13	33	24	12	24	20
	17	12		7	33	16	16	32	5	13	16	14
	21	23		19	30	18	26	24	19	16	20	13
	17	13		14	28	14	20	17	16	12	17	23
	22	15		19	30	14	22	23	20	13	13	22
	12	14		14	31	12	18	23	10	14	28	21
	8	16		18	24	17	24	19	17	20	14	19
	10	11		13	25	11	16	20	19	17	19	24
		13		18	31	18	23	25	22	21	15	21
		18		17	30	12	14	22	15	22	22	22
		18		15	29	21	23	15	13	21	19	24
		9		12	25	11	21	25	13	22	18	22
		7		17	27	19	26	18	20	19		22
		15			21	21	17	24	15	18		20
		10			29	21	19	22	14	17		22
		11			27	21	25	25	13	24		24
					21	22	25		15	12		27
					23	20	17		15	13		10
					30	21	11		15			28
						18			19			23
												21
												24

TABLE 1 - Continued

	Cell-9			Cell-10			Cell-11			Cell-12		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
M	24.4	13.0	13.6	14.5	15.5		21.6	17.6	15.6	19.3	14.2	16.9
	25	17	19	14	19		26	11	7	25	23	10
	27	15	17	18	14		26	13	2	18	16	27
	24	11	11	18	8		16	12	13	16	20	12
	17	6	25	14	17		21	23	19	19	25	26
	22	7	10	10	14		26	17	7	19	16	9
	21	9	22	21	6		15	18	13	23	8	10
	21	10	21	17	6		26	17	21	12	14	10
	20	5	13	13	18		21	18	18	18	20	17
	24	26	14	13	13		26	21	9	15	19	8
	27	13	23	18	13		18	21	16	20	13	17
	24	16	8	5	16		23	9	17	27	8	20
	24	17	13	13	18		28	13	11	15	20	11
	26	19	12	13	16		24	21	12	13	13	20
	23	7	9	11	10		23	26	7	12	9	16
	21	11	11	19	20		19	19	21	20	4	16
	23	9	10	13	13		29	17	20	25	8	18
	29	14	15	8	12		23	26	13	17	22	21
	27	13	25	23	20		21	25	16	21	9	11
	25	15	7	13	18		24	16	19	28	16	25
	26	21	11	15	12		20	14	14	26	12	25
	25	26	7	20	25		19	15	12	18	8	19
	25	18	17	11	10		22	21	13	17	6	14
	28	8	12	16	15		10	23	18	21	19	24
	27	6	11	11	11		22	16	25		16	16
	27	10	10		10		20	15	5		15	24
	24	14	6		17		25	11	19			3
	21	15	11		10		24	14	16			22
	25	6	10		16		14	28	14			15
	23	21			14		27	15	17			27
	25	16			19		20	14	16			18
	29				15		21		17			20
					20		21		22			12
							20		18			13
							20		27			18
							15		23			15
									22			20
												17

TABLE 1.—Continued.

	Cell-13			Cell-14			Cell-15			Cell-16		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
M	10.9	17.0	18.4	13.7	23.0	19.0	8.1	20.5	27.0	21.6	19.4	19.2
	7	19	20	18	25	27	9	12	23	16	19	21
	21	14	23	18	26	24	9	18	29	20	28	18
	9	20	33	17	21	19	7	25	30	22	24	17
	12	18	10	20	25	30	8	24	30	20	17	19
	10	14	33	20	17	27	9	19	24	21	20	19
	10	16	26	3	27	23	9	26	28	18	13	19
	10	18	31	19	26	24	12	20	30	15	13	26
	7	25	31	19	21	31	5	20	30	28	17	25
	13	24	32	19	13	9	5	24	27	20	13	21
	13	10	31	22	23	25	8	21	26	20	25	28
	7	19	32	17	15	8	12	24	31	24	19	24
	6	14	11	5	7	15	7	26	27	28	13	18
	7	14	15	11	25	28	8	18	26	21	14	24
	18	18	20	13	26	20	8	23	27	21	20	21
	18	12	27	16	24	27	12	19	22	25	20	13
	5	13	13	7	24	17	3	22	25	23	25	13
	14	14	10	21	28	18	4	15	30	21	23	23
	8	15	10	15	19	10	9	27	27	25	14	21
	15	15	12	17	27	28	4	19	28	27	15	15
	10	22	13	8	22	15	8	21	27	27	20	15
	11	20	7	9	17	20	10	11	27	24	18	13
	10	22	12	9	23	11	11	21	24	26	23	13
	7	8	26	9	24	12	10	18	28	27	16	14
	9	10	14	12	25	16	7	12	29	30	25	8
	17	23	15	10	29	16	2	16	24	28	20	21
	9	22	12	9	25	19	12	19	27	26	24	22
	13	22	11	11	26	6	11	21	28	34	20	22
	9	14	19	9	25	22	7	25	23	27	16	26
	14		33	17	29	24		25	25	6	25	19
	8		22	17	27	13		20	28	11	22	
			10	9	28	14		24	29	3		
			7	11	22	26		17		16		
			18	11	21	18		22		12		
			12	19				28				
			10	13				16				
			8	16								
			15	14								
				12								

TABLE 2.—Class means and pupils' raw and sta-eleven scores on subject-matter tests by classes within cells in the first television experiment

	Classes — Cell-1									
	El. Sci.$_1$		El. Sci.$_2$		Soc. Stu.$_1$		H.S. Math$_1$		U.S. History$_1$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	56.3	5.93	52.6	3.71	50.7	4.41	26.7	6.04	32.1	5.66
	58	6	50	3	68	7	31	7	39	7
	48	5	19	0	55	5	33	8	31	5
	59	7	54	4	55	5	34	9	30	5
	50	5	72	6	49	4	19	4	32	6
	49	5	76	5	41	3	22	5	32	6
	67	7	46	3	53	5	22	5	39	7
	52	5	67	5	42	3	24	5	31	5
	32	2	53	4	55	5	24	5	28	5
	62	6	64	5	39	3	24	5	23	4
	57	6	44	3	54	5	24	5	40	7
	69	8	62	4	45	4	24	5	43	8
	48	5	47	3	43	3	27	6	25	4
	59	7	71	6	52	5	26	6	18	3
	54	6	32	2	35	2	27	6	32	6
	44	4	43	3	58	5	28	6	9	0
	80	10	63	5	46	4	28	6	17	2
	51	5	66	5	55	5	28	6	40	7
	76	8	73	6	46	4	30	7	32	6
	48	5	53	4	55	5	29	7	42	8
	30	2	52	4	51	5	32	8	15	2
	68	7	41	2	49	4	31	7	19	3
	79	9	43	3	43	3	30	7	34	6
	57	6	58	4	63	6	17	4	35	6
	53	6	57	4	65	6			28	5
	44	4	51	3	38	3			24	4
	65	7	22	1	64	6			41	8
	65	7	54	4	44	4			36	6
	62	6	66	5	65	6			39	7
	57	6	79	7	42	3			38	7
			60	4					40	7
			58	4					49	10
			60	5					47	9
			52	4						
			38	2						
			60	4						
			44	3						
			41	2						
			18	0						

TABLE 2.—Continued

	Classes — Cell-2									
	El. Sci_{14}		H.S. $Math_2$		U.S. $History_2$		Soc. $Stu._2$		El. $Sci._3$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	64.7	5.04	28.4	6.70	18.7	2.79	38.4	2.70	49.8	4.94
	31	7	30	7	16	2	40	3	46	4
	76	6	25	6	21	3	29	1	47	5
	67	5	25	6	16	2	56	5	67	7
	59	5	32	8	20	3	34	2	45	4
	83	7	30	7	11	1	31	2	39	3
	73	6	32	8	24	4	57	5	44	4
	74	6	30	7	25	4	32	2	60	6
	49	3	31	7	27	5	38	3	67	7
	31	2	18	4	10	1	50	4	57	6
	71	6	31	7	14	2	29	1	53	6
	66	5			20	3	28	1	66	7
	79	7			22	3	22	1	61	7
	76	6			18	3	21	0	59	6
	19	0			18	3	54	5	72	8
	68	5					50	4	65	7
	61	5					52	5	47	5
	67	6					49	4	32	2
	79	7					14	0	53	6
	25	1					28	1	47	5
	60	4					55	5	57	6
	54	4							58	6
	67	5							60	6
	85	8							50	5
									44	4
									32	2
									35	3
									53	6
									67	7
									21	1
									42	4
									42	4
									42	4
									15	0

TABLE 2.—Continued

	Classes — Cell-3									
	El. Sci.$_6$		El. Sci.$_5$		El. Sci.$_7$		Chemistry$_1$		H.S. Math$_3$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	44.8	2.83	47.1	3.06	79.5	7.27	31.6	5.26	21.6	4.79
	63	5	62	5	69	5	41	7	5	0
	47	4	54	4	91	10	29	5	29	7
	41	2	43	3	87	9	36	6	24	5
	42	3	59	4	73	6	35	6	31	8
	33	2	42	3	81	7	35	6	15	3
	36	2	64	5	79	7	40	7	25	6
	33	2	49	3	89	9	22	3	21	4
	67	5	19	0	90	10	38	6	12	2
	35	2	39	2	87	9	44	8	23	5
	51	3	27	1	88	9	19	3	17	4
									18	4
	45	3	54	4	81	7	31	5		
	39	2	58	4	94	10	23	4	29	7
	44	3	42	3	76	6	26	4	22	5
	49	3	57	4	67	5	29	5	32	7
	36	2	41	2	80	7	15	2		
	19	0	40	2	84	8	26	4		
	40	2	41	2	85	8	34	6		
	46	3	56	4	83	7	40	7		
	64	5			84	8	37	6		
	47	3			68	5				
	60	4			60	4				
	46	3			52	4				
	30	1								
	36	2								
	36	2								
	72	6								
	48	3								
	53	4								
	30	1								

TABLE 2.—Continued

	Classes — Cell-4									
	$Algebra_1$		$Algebra_2$		El. $Sci._8$		El. $Sci._9$		$Physics_1$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	12.4	3.13	21.0	5.54	47.1	4.52	45.5	4.34	23.1	3.18
	16	4	14	4	69	8	47	5	18	2
	10	3	16	4	48	5	67	7	33	6
	19	5	17	5	45	4	21	1	23	3
	26	7	20	5	24	1	50	5	29	5
	12	3	24	6	55	6	45	4	23	3
	20	5	20	5	45	4	38	3	28	5
	5	1	22	6	57	6	19	1	29	5
	3	0	25	6	49	5	50	5	14	0
	6	1	22	6	31	2	53	6	18	2
	12	3	28	7	43	4	46	4	16	1
	10	3	14	4	77	9	51	5	23	3
	12	3	14	4	44	4	39	3		
	5	1	25	6	39	3	38	3		
	9	2	15	4	51	5	70	8		
	4	1	16	4	23	1	42	4		
	11	3	20	5	62	7	55	6		
	7	2	29	8	43	4	61	7		
	8	2	29	8	39	3	39	3		
	19	5	25	6	44	4	35	3		
	3	0	13	4	51	5	47	5		
	10	3	31	8	50	5	76	9		
	28	7	15	4			50	5		
	31	8	17	5			46	4		
			20	5			54	6		
			27	7			35	3		
			21	5			30	2		
			33	10			40	3		
			15	4			45	4		
							30	2		

TABLE 2.—Continued

	Classes — Cell-5									
	El. Sci.$_{10}$		El. Sci.$_{11}$		El. Sci.$_{12}$		El. Sci.$_{13}$		Chemistry$_{2}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	44.7	4.12	47.6	4.76	56.1	5.91	59.7	6.37	39.4	7.07
	57	6	54	6	48	5	67	7	43	8
	52	5	66	7	44	4	66	7	40	7
	51	5	46	4	68	8	68	8	40	7
	30	2	41	4	58	6	45	4	27	5
	48	5	42	4	58	6	77	9	36	6
	44	4	53	6	61	7	55	6	37	6
	68	8	39	3	41	4	38	3	45	9
	75	9	24	1	39	3	69	8	42	7
	38	3	56	6	61	7	70	8	42	7
	37	3	61	7	43	4	60	6	40	7
	36	3	36	3	64	7	71	8	37	6
	44	4	48	5	57	6	67	7	44	8
	61	7	51	5	54	6	65	7	28	5
	40	3	53	6	39	3	54	6	46	9
	31	2	48	5	59	6	56	6	43	8
	36	3	51	5	80	1	73	8	44	8
	45	4	59	6	44	4	52	5	33	6
	52	5	48	5	59	6	52	5	26	4
	33	2	51	5	64	7	75	8	30	5
	38	3	58	6	66	7	54	6	44	8
	28	1	52	5	59	6	39	3	36	6
	37	3	48	5	68	8	46	4	48	10
	51	5	47	5			62	7	40	7
	38	3	13	0			56	6	45	9
	70	8	41	4			41	4	40	7
	45	4	57	6			61	7	40	7
	43	4	41	4			63	7	44	8
	32	2	62	7			56	6	43	8
	41	4	65	7			62	7		
	50	5	50	5			62	7		
	34	2	15	0			59	6		
	52	5	53	6			84	10		
	63	7	42	4			52	5		
	46	4					74	9		
	36	3					38	3		
	39	3								
	49	5								
	38	3								
	40	3								
	34	2								

TABLE 2.—Continued

	Classes — Cell-6									
	El. Sci.$_{14}$		El. Sci.$_{15}$		Physics$_{2}$		Soc. Stu.$_{3}$		H.S. Math$_{4}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	51.8	3.61	38.6	3.50	28.3	5.11	59.0	5.78	22.3	4.87
	75	6	34	3	21	3	54	5	23	5
	45	3	43	4	20	3	71	9	20	4
	61	5	38	3	27	5	62	6	19	4
	54	4	48	5	24	4	60	6	14	3
	49	3	34	3	22	3	68	7	12	2
	21	1	44	4	17	2	45	4	27	6
	13	0	30	2	27	5	68	7	30	7
	69	5	31	2	24	4	69	7	16	3
	73	6	36	3	30	5	48	4	32	8
	47	3	41	4	38	9	66	7	28	6
	52	4	33	3	17	2	48	4	27	6
	59	4	25	2	23	3	45	4	30	7
	56	4	41	4	37	8	53	5	8	0
	59	4	49	5	26	4	53	5	18	4
	28	1	42	4	35	7	59	6	25	6
	51	3	49	5	30	5	49	4	24	5
	48	3			35	7	46	4	23	5
	73	6			30	5	57	5	34	9
	44	3			28	5	57	5	20	4
	52	4			36	7	62	6	23	5
	41	2			38	9	46	4	18	4
	44	3			31	6	66	7	21	4
	55	4			28	5	58	5	23	5
	46	3			27	5	66	7	22	5
	55	4			27	5	61	6	23	5
	59	4			32	6	67	7	24	5
	62	5			33	6	60	6	23	5
	59	4					61	6	21	4
							61	6	17	4
							68	7	18	4
									29	7
							63	6		
							70	8		

TABLE 2.—Continued

	Classes — Cell-7									
	$Physics_3$		$Algebra_3$		H.S. $Math_5$		H.S. $Math_6$		Okla. $Hist._1$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	31.1	5.96	26.4	6.97	18.1	3.69	22.4	4.89	62.0	5.94
	22	3	25	6	10	1	28	6	62	6
	23	3	32	9	25	6	13	3	72	8
	31	6	23	6	25	6	27	6	68	7
	36	7	33	10	28	6	24	5	55	5
	27	5	21	5	25	6	18	4	69	7
	26	4	28	7	8	0	24	5	75	8
	34	7	22	6	21	4	17	4	80	8
	37	8	15	4	11	2	16	3	63	6
	31	6	30	8	24	5	32	8	46	4
	23	3	23	6	24	5	27	6	54	5
	36	7	29	8	15	3	17	4	76	8
	37	8	27	7	33	8	12	2	61	6
	34	7	29	8	12	2	21	4	64	6
	39	10	26	7	11	2	20	4	68	7
	30	5	31	8	10	1	21	4	56	5
	35	7	31	8	7	0	33	8	71	7
	34	7	27	7	11	2	32	8	62	6
	39	10	20	5	15	3	23	5	58	5
	24	4	17	5	22	5	21	4	41	3
	22	3	31	8	13	3			64	6
	30	5	24	6	27	6			60	6
	36	7	28	7	14	3			72	8
	29	5	33	10	12	2			67	7
			30	8	20	4			55	5
			28	7	27	6			64	6
			28	7	10	1			49	4
			27	7	25	6			59	5
			25	6	22	5			65	6
			28	7	17	4			59	5
			30	8					65	6
			25	6					48	4
			19	5					58	5
			22	6					61	6
			32	9						

TABLE 2.—Continued

	Classes — Cell-8									
	H.S. Math$_{7}$		Soc. Stu.$_{4}$		El. Sci.$_{17}$		El. Sci.$_{16}$		Okla. Hist.$_{2}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	22.6	4.96	44.1	3.67	56.7	6.06	49.0	4.90	52.3	4.57
	20	4	44	4	59	6	62	6	70	7
	16	3	38	3	59	6	40	4	48	4
	30	7	45	4	56	6	40	4	41	3
	27	6	52	5	39	3	49	5	40	3
	16	3	48	4	50	5	59	6	43	3
	22	5	54	5	49	5	49	5	52	5
	28	6	33	2	61	7	43	4	53	5
	30	7	43	3	44	4	31	2	54	5
	16	3	44	4	61	7	37	3	42	3
	31	7	40	3	79	9	17	1	67	7
	16	3	30	1	51	5	42	4	63	6
	27	6	48	4	53	6	40	4	47	4
	20	4	41	3	42	4	77	9	49	4
	29	7	44	4	41	4	43	4	33	1
	26	6	53	5	45	4	50	5	41	3
	25	6	62	6	42	4	47	5	50	4
	20	4	45	4	75	9	74	8	55	5
	23	5	51	5	69	8	46	5	50	4
	17	4	32	2	76	9	63	7	68	7
	33	8	37	3	40	3	77	9	54	5
	14	3	42	3	61	7	54	5	66	7
	17	4			47	5	61	6	51	4
	20	4			62	7	47	5	66	7
	26	6			76	9	45	4		
	15	3			65	7	40	4		
					53	6	53	5		
					65	7	46	5		
					51	5	56	6		
					76	9	37	3		
					72	8	42	4		
					57	6	51	5		
					68	8				
					49	5				
					35	3				

TABLE 2.—Continued

	Classes — Cell-9									
	U.S. History$_3$		Soc. Stu.$_5$		Chemistry$_3$		Algebra$_4$		H.S. Math$_8$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	31.2	5.94	50.8	4.60	19.2	2.68	18.6	4.87	18.9	.00
	34	6	35	2	11	0	15	4	17	4
	42	8	61	6	14	1	17	5	21	4
	31	5	51	5	20	3	22	6	28	6
	27	5	45	4	25	4	12	3	24	5
	23	4	37	3	23	4	22	6	13	3
	31	5	66	7	13	1	12	3	21	4
	39	7	62	6	28	5	21	5	11	5
	26	4	41	3	20	3	22	6	12	5
	28	5	52	5	17	2	18	5	13	3
	25	4	55	5	19	3	22	6	24	5
	24	4	45	4	32	6	28	7	24	5
	31	5	57	6	13	1	27	7	13	3
	37	7	52	5	16	2	16	4	12	5
	32	6	63	5	15	2	18	5	22	5
	18	3	51	5	22	3	21	5	12	5
	33	6	53	5	21	3	17	5	19	4
	39	7	44	4	17	2	23	6	28	6
	34	6	34	2	19	3	19	5	12	5
	33	6	51	5	23	4	19	5	32	8
	35	6	69	7	15	2	23	6	26	6
	27	5	54	5	21	3	20	5	13	3
	32	6	64	6	22	3	16	4		
	42	8	49	4	14	1	12	3		
	29	5	44	4	20	3	23	6		
	21	3	34	2	20	3	21	5		
	24	4					11	3		
	35	6					5	1		
	32	6					16	4		
	33	6					17	5		
	25	4					24	6		
	32	6								
	36	6								
	24	4								
	41	8								
	36	6								

TABLE 2.—Continued

	Classes — Cell-10									
	El. Sci.$_{18}$		Chemistry$_4$		Chemistry$_5$		Chemistry$_6$		Algebra$_5$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	63.1	6.47	27.7	4.58	29.3	4.97	32.0	5.53	18.2	4.87
	76	9	10	0	27	5	23	4	10	3
	54	5	39	7	43	7	24	4	31	8
	75	8	42	7	24	4	33	6	31	8
	68	7	30	5	16	2	15	2	16	4
	42	4	19	3	42	8	31	5	16	4
	69	7	30	5	27	5	28	5	23	6
	58	6	25	4	33	6	29	5	16	4
	62	6	34	6	25	4	25	4	25	6
	70	7	26	4	44	8	28	5	13	4
	62	6	16	2	25	4	11	0	16	4
	62	6	16	2	31	5	36	6	24	6
	53	5	29	5	29	5	23	4	16	4
	71	7	35	6	39	7	26	4	16	4
	71	7	19	3	33	6	25	4	10	3
	59	6	26	4	31	5	32	6	10	3
	71	7	25	4	31	5	24	4	10	3
	71	7	21	3	28	5	23	4	27	7
	78	10	23	4	30	5	19	3	17	5
	64	7	30	5	32	6	24	4	12	3
	76	9	24	4	41	7	28	5	13	4
	59	6	37	6	37	6	38	6	17	5
	36	3	47	10	45	9	36	6	28	7
	63	7	28	5	36	6	41	7	29	8
	73	8	33	6	26	4	29	5	17	5
	69	7			39	7	43	8	13	4
	51	5			40	7	32	6	23	6
	70	7			38	6	47	10	14	4
	75	8			31	5	23	4	16	4
	31	2			30	5	31	5	10	3
	54	5			23	4	31	5	26	7
					24	4	32	6		
					34	6	38	6		
					27	5	38	6		
					27	5				

TABLE 2—Continued

	Classes — Cell-11									
	Soc. Stu.$_6$		Soc. Stu.$_7$		Chemistry$_7$		H.S. Math$_9$		Algebra$_6$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	49.2	4.15	56.8	5.48	24.0	3.91	21.5	4.63	11.4	3.00
	36	2	48	4	29	5	28	6	7	2
	59	6	56	5	25	4	25	6	8	2
	65	6	52	5	17	2	20	4	11	3
	50	4	42	3	27	5	14	3	12	3
	61	6	67	7	16	2	28	6	12	3
	54	5	45	4	25	4	21	4	12	3
	60	6	70	8	20	3	23	5	9	2
	50	4	42	3	32	6	32	7	23	6
	57	5	56	5	22	3	13	3	14	4
	37	3	61	6	24	4	24	5	13	4
	50	4	66	7	27	5	31	7	14	4
	48	4	70	8			25	6	16	4
	30	1	62	6			16	3	7	2
	41	3	63	6			27	6	14	4
	53	5	64	6			9	1	9	2
	19	0	66	7			15	3	6	1
	54	5	62	6			12	2	11	3
	65	6	59	6			17	4	8	2
	38	3	45	4			28	6	8	2
	43	3	52	5					13	4
	58	5	68	7					10	3
	67	7	67	7					9	2
	30	1	32	2					8	2
	48	4	59	6					21	5
	67	7	46	4					10	3
	38	3								

TABLE 2.—Continued

	Classes — Cell-12									
	El. Sci.$_{19}$		El. Sci.$_{20}$		El. Sci.$_{21}$		Soc. Stu.$_{8}$		H.S. Math$_{10}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	71.9	5.91	53.2	5.47	43.0	4.00	63.9	6.78	24.7	5.66
	67	5	69	9	42	4	73	9	20	4
	86	6	63	7	43	4	65	6	18	4
	67	5	55	6	41	4	63	6	19	4
	73	6	66	7	54	6	50	4	24	5
	83	7	47	5	40	3	46	4	15	3
	82	7	60	6	39	3	59	6	30	7
	85	6	31	1	48	5	51	5	23	5
	54	4	46	4	64	7	71	9	30	7
	66	5	45	4	35	3	68	7	30	7
	83	7	64	7	53	6	67	7	33	8
	54	4	54	6	33	2	71	9	26	6
	86	6	51	5	47	5	60	6	23	5
	74	6	82	10	44	4	69	7	14	3
	60	4	37	2	43	4	68	7	14	3
	57	4	50	5	41	4	68	7	26	6
	86	6	46	4	39	3	61	6	26	6
	70	5	62	7	42	4	70	8	34	9
	53	4	56	6	42	4	61	6	28	6
	68	5	64	7	43	4	61	6	30	7
	84	6	70	9	40	3	67	7	17	4
	72	6	67	7	40	3	69	7	18	4
	62	3	39	2	32	3	72	9	22	4
	81	7	62	7	42	4	71	9	32	8
	63	5	45	4	29	1	73	9	30	7
	60	4	47	5	38	3	72	9	34	9
	84	6	65	7	35	3	70	8	27	6
	64	5	56	6	53	6	71	9	29	7
	57	4	19	1	41	4	47	4	25	6
	76	6	66	7	42	4	55	5	21	4
	79	7	68	9	42	4	52	5		
	83	7	48	5	42	4	63	6		
	83	7	51	5	48	5	59	6		
			13	1			59	6		
			44	4			64	6		
							66	7		
							69	7		

TABLE 2.—Continued

	Classes — Cell-13									
	El. Sci.$_{22}$		El. Sci.$_{23}$		Soc. Stu.$_{9}$		Okla. Hist.$_{3}$		Algebra$_{7}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	44.6	4.18	40.0	3.27	51.2	4.61	52.9	4.35	12.0	3.18
	61	6	52	5	35	2	44	4	18	5
	33	3	29	1	56	5	41	3	15	4
	52	5	33	2	42	3	35	2	15	4
	57	6	28	1	44	4	41	3	16	4
	29	2	55	6	73	9	38	2	1	0
	53	5	33	2	39	3	38	2	7	2
	47	5	43	4	50	4	33	1	6	1
	43	4	29	1	56	5	39	2	15	4
	37	3	47	5	48	4	39	2	17	5
	62	6	39	3	47	4	35	2	12	3
	28	2	48	5	40	3	32	0	10	3
	44	4	30	2	37	3	43	3		
	58	6	52	5	48	4	41	3		
	32	3	34	2	55	5	39	2		
	34	3	41	4	66	7	43	3		
	46	5	34	2	61	6	46	4		
	33	3	49	5	70	8	33	1		
	34	3	52	5	68	7	67	7		
	24	1	36	3	46	4	98	9		
	28	2	45	4	36	2	46	4		
	43	4	29	1	43	3	47	4		
	60	6	41	4	37	3	59	5		
	36	3			44	4	58	5		
	62	6			69	7	57	5		
	49	5			67	7	67	7		
	68	7			39	3	37	2		
	40	4			62	6	42	3		
	65	7			62	6	98	9		
	54	5			31	2	74	8		
	27	2			68	7	57	5		
	72	8			50	4	48	4		
	61	6			57	5	68	7		
	30	2			34	2	69	7		
	15	0			34	2	53	5		
					60	6	65	6		
					68	7	99	10		
							96	9		
							44	4		
							55	5		
							56	5		

TABLE 2.—Continued

	Classes — Cell-14									
	El. Sci.$_{24}$		El. Sci.$_{25}$		El. Sci.$_{26}$		H.S. Math$_{11}$		H.S. Math$_{12}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	61.0	6.35	66.9	5.38	65.7	5.11	22.2	4.80	30.2	7.36
	53	5	79	7	77	6	22	5	27	6
	57	6	65	5	71	6	26	6	30	7
	56	6	80	7	62	5	20	4	33	8
	51	5	62	5	73	6	27	6	34	9
	44	4	73	6	57	4	12	2	24	5
	43	4	55	4	49	3	16	3	34	9
	61	6	71	6	62	5	33	8	34	9
	61	6	78	6	74	6	27	6	32	8
	51	5	52	4	85	8	17	4	27	6
	66	7	31	2	66	5	22	5	23	5
	56	6	60	4	66	5	30	7	34	9
	41	4	81	7	81	7	26	6		
	54	5	73	6	25	1	31	7		
	60	6	82	7	71	6	26	6		
	79	10	83	7	73	6	31	7		
	72	8	62	5	53	4	15	3		
	72	8	78	6	67	5	10	1		
	72	8	81	7	78	6	20	4		
	70	7	79	7	58	4	21	4		
	70	7	70	5	69	5	25	6		
	53	5	67	5	73	6	30	7		
	69	7	53	4	78	6	21	4		
	56	6	55	4	83	7	10	1		
	69	7	85	8	52	4	19	4		
	64	6	61	5	39	2	25	6		
	69	7	56	4	79	7	14	3		
	52	5	70	5	78	6	23	5		
	66	7	45	3	39	2	21	4		
	78	10	76	6	61	5	24	5		
	72	8	87	9	61	5	23	5		
	68	7	52	4	51	3				
	61	6	73	6	58	4				
	56	7	47	3	77	6				
	53	5	54	4	63	5				
					75	6				
					81	7				

TABLE 2.—Continued

	Classes — Cell-15									
	El. Sci.$_{27}$		Soc. Stu.$_{10}$		Physics$_{4}$		Okla. Hist.$_{4}$		Algebra$_{8}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	42.4	3.97	61.1	6.27	27.5	4.71	48.7	4.04	21.8	5.57
	39	4	70	8	19	2	34	2	19	5
	50	5	62	6	16	1	51	4	11	3
	20	1	60	6	24	4	70	7	21	5
	57	6	63	6	38	9	40	3	25	6
	41	4	58	5	33	6	65	6	16	4
	51	5	48	4	26	4	67	7	30	8
	30	2	59	6	35	7	42	3	23	6
	51	5	40	3	18	2	51	4	24	6
	43	4	69	7	28	5	29	0	27	7
	47	5	40	3	33	6	71	7	25	6
	38	3	41	3	24	4	44	4	24	6
	64	7	68	7	30	5	44	4	22	6
	33	3	73	9	29	5	34	2	19	5
	36	3	70	8	22	3	47	4	24	6
	73	8	63	6	31	6	44	4	20	5
	28	2	73	9	24	4	55	5	23	6
	43	4	74	10	35	7	60	6	19	5
	44	4	67	7	19	2	53	5	25	6
	54	5	43	3	32	6	60	6	16	4
	56	6	69	7	29	5	34	2	32	9
	48	5	70	8	31	6	51	4	20	5
	46	5	46	4	31	6	49	4	12	3
	43	4	58	5	31	6	43	3	25	6
	38	3	70	8	24	4	37	2	16	4
	36	3	74	10	30	5	49	4	19	5
	35	3	65	6	30	5	41	3	30	8
	56	6	41	3	26	4			21	5
	60	6	70	8	23	3			24	6
	45	4	70	8					27	7
	23	1	58	5					14	4
	17	1								
	44	4								
	10	0								

TABLE 2.—Continued

	Classes — Cell-16									
	U.S. History$_4$		El. Sci.$_{28}$		El. Sci.$_{29}$		El. Sci.$_{30}$		Algebra$_9$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	28.1	4.88	59.3	4.47	76.4	6.30	73.8	6.29	20.3	5.42
	27	5	88	9	75	6	86	8	20	5
	23	4	44	3	77	6	45	3	13	4
	42	8	57	4	67	5	50	3	29	8
	15	2	45	3	67	5	70	5	17	5
	37	7	57	4	76	6	70	5	30	8
	34	6	51	3	75	6	59	4	30	8
	17	2	54	4	73	6	90	10	8	2
	33	6	55	4	70	5	84	8	6	1
	24	4	70	5	80	7	84	8	24	6
	11	1	51	3	74	6	85	8	17	5
	30	5	71	6	81	7	79	7	15	4
	28	5	65	5	80	7	84	8	22	6
	26	4	38	2	85	8	85	8	15	4
	22	3	73	6	85	8	86	8	28	7
	33	6	52	4	81	7	61	5	27	7
	24	4	76	6	77	6	71	6	24	6
	28	5	71	6	75	6	69	5	31	8
	27	5	62	5	87	9	63	5	26	7
	18	3	46	3	66	5	88	9	13	4
	45	9			80	7	72	6	12	3
	24	4			82	7	79	7	29	8
	38	7			69	5	75	6	7	2
	46	9			75	6	80	7	23	6
	21	3			78	6	66	5	26	7
	30	5			75	6	77	6	22	6
					83	7	86	8	15	4
					70	5	62	5		
					68	5	74	6		
					67	5	64	5		
					81	7	84	8		
					80	7	72	6		
					85	8	55	4		
					77	6	82	7		
							68	5		
							77	6		

TABLE 3.—Class means and pupils' raw and sta-eleven scores on subject-matter tests by classes within cells in the second radio experiment

	Classes — Cell-1									
	C. U.S.A.$_3$		C. U.S.A.$_1$		C. U.S.A.$_2$		C. U.S.A.$_4$		F. of F.$_1$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	33.6	5.65	26.6	4.35	38.3	6.69	29.5	5.03	28.4	8.09
	32	6	37	7	25	4	36	6	28	8
	12	1	19	3	32	6	37	7	32	9
	15	1	39	7	48	8	26	4	30	8
	41	7	27	5	37	7	32	6	31	9
	18	2	28	5	32	6	22	4	31	9
	25	4	22	3	42	7	24	4	31	9
	32	6	25	4	48	8	40	7	31	9
	34	6	26	4	36	6	37	7	29	8
	31	5	35	6	37	7	17	2	27	8
	39	7	38	7	36	6	33	6	33	10
	43	7	27	5	40	7	31	5	28	8
	21	3	37	7	42	7	30	5	27	8
	41	7	24	4	41	7	16	2	28	8
	34	6	33	6	27	5	25	4	31	9
	39	7	9	0	42	7	29	5	27	8
	28	5	26	4	34	6	31	5	31	9
	35	6	31	5	37	7	28	5	26	7
	20	3	36	6	49	9	28	5	28	8
	21	3	28	5	35	6	33	6	31	9
	35	6	26	4	25	4	26	4	28	8
	41	7	38	7	31	5	18	2	25	7
	43	7	21	3	44	8	28	5	28	8
	44	8	26	4	45	8	32	6	27	8
	30	5	31	5	46	8	31	5	32	9
	19	3	23	4	27	5	30	5	32	9
	41	7	14	1	48	8	27	5	23	7
	35	6	24	4	45	8	36	6	26	7
	46	8	27	5	48	8	32	6	28	8
	50	9	17	2	45	8	26	4	32	9
	48	8	18	2	44	8	28	5	29	8
	49	9	21	3	42	7	40	7	26	7
			24	4	41	7	36	6	21	6
			26	4	27	5			26	7
			20	3	24	4			25	7
					39	7			26	7

TABLE 3.—Continued

	Classes — Cell-2									
	F. of $F._2$		F. of $F._3$		F. of $F._4$		C. $U.S.A._6$		C. $U.S.A._5$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	19.7	5.63	12.7	3.19	14.0	3.85	29.7	5.04	17.6	2.30
	22	6	15	4	19	6	14	1	27	5
	26	7	15	4	7	1	24	4	23	4
	16	5	16	5	12	3	29	5	18	2
	21	6	19	6	14	4	29	5	19	3
	23	7	17	5	12	3	22	4	13	1
	13	4	21	6	15	4	30	5	18	2
	19	6	19	6	12	3	42	7	16	2
	20	6	8	1	16	5	26	4	14	1
	20	6	12	3	19	6	37	7	8	0
	19	6	12	3	14	4	32	6	8	0
	22	6	6	0	18	5	28	5	25	4
	23	7	14	4	17	5	34	6	22	4
	19	6	6	0	14	4	20	3	20	3
	14	4	8	1	10	2	31	5	28	5
	12	3	11	3	9	2	23	4	18	2
	21	6	5	0	11	3	19	3	21	3
	18	5	20	6	8	1	38	7	8	0
	20	6	14	4	18	5	35	6	13	1
	18	5	8	1	23	7	39	7	12	1
	17	5	9	2	11	3	40	7	21	3
	9	2	12	3	18	5	23	4		
	19	6			15	4	43	7		
	25	7			17	5	36	6		
	22	6			15	4	15	2		
	27	8			13	4	34	6		
	21	6			13	4				
	18	5			15	4				
	22	6			12	3				
	27	7			10	2				
	10	2			14	4				
	25	1			11	3				
					19	6				
					11	3				

TABLE 3.—Continued

	Classes — Cell-3									
	C. U.S.A.$_7$		F. of F.$_5$		F. of F.$_6$		F. of F.$_7$		C. U.S.A.$_8$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	19.7	2.82	12.2	2.95	24.5	7.35	12.7	3.47	34.2	5.92
	12	1	10	2	18	5	13	4	29	5
	23	4	11	3	35	10	12	3	37	7
	20	3	8	1	33	10	13	4	36	6
	25	4	14	4	28	8	10	2	41	7
	18	2	20	6	28	8	16	5	35	6
	15	2	23	7	34	10	14	4	41	7
	16	2	18	5	24	7	14	4	32	6
	25	4	17	5	27	8	17	5	36	6
	19	3	14	4	26	7	11	3	32	6
	22	3	8	1	28	8	14	4	41	7
	22	3	8	1	23	7	14	4	30	5
			11	3	22	6	9	2	21	3
			14	4	24	7	11	3	33	6
			5	0	28	8	10	2		
			10	2	28	8	11	3		
			5	0	23	7	12	3		
			6	0	2	0	11	3		
			9	2	19	6	12	3		
			10	2	27	8	8	1		
			23	7	30	8	8	1		
			12	3	17	5	12	3		
					27	8	15	4		
					20	6	14	4		
					28	8	12	3		
					21	6	16	5		
					20	6	13	4		
					33	10	14	4		
					21	6	16	5		
					23	7	14	4		
					23	7	16	5		
					24	7				
					22	6				
					26	7				
					25	7				
					24	7				
					15	4				
					32	9				

TABLE 3.—Continued

	Classes — Cell-4									
	C. U.S.A.$_{11}$		C. U.S.A.$_{9}$		C. U.S.A.$_{13}$		C. U.S.A.$_{12}$		C. U.S.A.$_{10}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	28.6	4.90	27.6	4.63	20.1	3.00	28.5	4.75	21.9	3.42
	11	1	38	7	21	3	15	2	21	3
	26	4	25	4	12	1	38	7	17	2
	40	7	24	4	14	1	37	7	31	5
	28	5	28	5	32	6	31	5	22	4
	32	6	33	6	24	4	38	7	23	4
	45	8	35	6	14	1	32	6	26	4
	19	3	6	0	27	5	23	4	21	3
	15	2	27	5	26	4	34	6	25	4
	24	4	40	7	16	2	44	8	23	4
	22	4	34	6	23	4	20	3	25	4
	38	7	29	5	16	2	25	4	28	5
	23	4	32	6	15	2	23	4	28	5
	39	7	26	4	15	2	43	7	20	3
	30	5	36	6	19	3	38	7	23	4
	22	4	34	6	20	3	49	9	26	4
	26	4	20	3	19	3	25	4	18	2
	23	4	28	5	19	3	20	3	23	4
	25	4	32	6	27	5	36	6	15	2
	32	6	39	7	10	0	21	3	16	2
	35	6	23	4	10	0	17	2	19	3
	30	5	28	5	19	3	25	4	25	4
	45	8	35	6	15	2	27	5	17	2
	41	7	27	5	23	4	40	7	18	2
	31	5	20	3	15	2	25	4	17	2
	22	4	21	3	28	5	9	0	24	4
	32	6	26	4	24	4	31	5	22	4
	19	3	22	3	28	5	28	5	21	3
	33	6	38	7	21	3	16	2	19	3
	24	4	29	5	28	5	16	2	23	4
	20	3	25	4	34	6	19	3	20	3
	34	6	26	4	15	2	45	8	22	4
			19	3	28	5	21	3		
			25	4	10	0				
			26	4	15	2				
			17	2	21	3				
			22	3	19	3				
			39	7						
			15	2						

TABLE 3.—Continued

	Classes — Cell-5									
	F. of $F._8$		F. of $F._9$		C. $U.S.A._{14}$		C. $U.S.A._{15}$			
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	11.9	3.00	11.5	2.91	27.3	4.49	25.9	4.21		
	15	4	16	5	26	4	36	6		
	12	3	10	2	35	6	19	3		
	14	4	11	3	25	4	29	5		
	11	3	9	2	24	4	13	1		
	10	2	8	1	32	6	33	6		
	12	3	9	2	26	4	18	2		
	16	5	8	1	21	3	31	5		
	10	2	6	0	20	3	14	1		
	18	5	9	2	31	5	24	4		
	7	1	11	3	43	7	23	4		
	11	3	4	0	23	4	26	4		
	14	4	11	3	21	3	20	3		
	12	3	17	5	31	5	30	5		
	15	4	13	4	35	6	21	3		
	8	1	9	2	27	5	17	2		
	13	4	10	2	46	8	24	4		
	8	1	17	5	33	6	24	4		
	14	4	8	1	19	3	31	5		
	20	6	18	5	12	1	32	6		
	16	5	9	2	14	1	36	6		
	11	3	9	2	26	4	22	4		
	11	3	13	4	26	4	24	4		
	12	3	13	4	14	1	19	3		
	11	3	17	5	32	6	33	6		
	8	1	13	4	33	6	45	8		
	6	0	14	4	21	3	36	6		
	12	3	10	2	36	6	22	4		
	13	4	13	4	33	6	29	5		
	10	2	8	1	23	4	30	5		
	8	1	18	5	21	3	28	5		
			8	1	31	5	29	5		
			11	3	27	5	28	5		
			17	5	38	7	9	0		
			13	4	19	3				
			14	4	24	4				
					30	5				
					32	6				

TABLE 3.—Continued

	Classes — Cell-6									
	F. of $F._{11}$		F. of $F._{13}$		F. of $F._{14}$		F. of $F._{10}$		F. of $F._{12}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	18.9	5.50	19.8	5.64	18.6	5.39	13.3	3.60	11.6	2.85
	21	6	19	6	17	5	17	5	6	0
	16	5	24	7	15	4	11	3	6	0
	13	4	12	3	15	4	7	1	14	4
	22	6	24	7	20	6	14	4	8	1
	18	5	28	8	19	6	14	4	8	1
	23	7	14	4	15	4	19	6	13	4
	19	6	[illegible]	6	23	7	19	6	12	3
	20	6	19	6	10	2	8	1	14	4
	15	4	23	7	19	6	15	4	11	3
	20	6	21	6	22	6	7	1	15	4
	16	5	24	7	20	6	12	3	17	5
	24	7	14	4	23	7	12	3	11	3
	25	7	22	6	23	7	19	6	12	3
	19	6	18	5	13	4	14	4	10	2
	22	6	9	2	20	6	19	6	8	1
	19	6	21	6	19	6	10	2	13	4
	17	5	21	6	22	6	11	3	8	1
	16	5	28	8	19	6	11	3	15	4
	24	7	26	7	20	6	15	4	16	5
	17	5	21	6	15	4	11	3	16	5
	21	6	23	7	15	4			10	2
	16	5	29	8	18	5			15	4
	20	6	11	3	22	6			9	2
	8	1	16	5	17	5			10	2
	26	7	18	5	24	7			8	1
	16	5	22	6	21	6			18	5
	24	7	15	4	20	6			7	1
	23	7	12	3	12	3			12	3
	22	6			22	6			14	4
	17	5			16	5			9	2
	14	4			19	6			11	3
	21	6							11	3
	14	4							16	5
	13	4							11	3

TABLE 3.—Continued

	Classes — Cell-7									
	C. U.S.A.$_{19}$		C. U.S.A.$_{16}$		F. of F.$_{15}$		C. U.S.A.$_{17}$		C. U.S.A.$_{18}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	30.2	5.23	24.5	3.97	14.3	3.97	29.0	4.9C	45.2	7.94
	26	4	22	3	12	3	27	5	49	9
	24	4	25	4	10	2	24	4	44	8
	19	3	37	7	12	3	34	6	45	8
	28	5	28	5	13	4	22	4	53	9
	21	3	34	6	12	3	36	6	53	9
	25	4	27	5	13	4	31	5	51	9
	26	4	12	1	8	1	23	4	52	9
	33	6	24	4	16	5	33	6	45	8
	33	6	22	3	17	5	33	6	51	9
	24	4	24	4	20	6	12	1	43	7
	37	7	17	2	20	6	16	2	50	9
	27	5	21	3	15	4	23	4	50	9
	33	6	16	2	14	4	25	4	45	8
	25	4	27	5	13	4	15	2	27	5
	37	7	30	5	19	6	16	2	37	7
	32	6	28	5	10	2	33	6	46	8
	32	6	22	3	10	2	12	1	33	6
	34	6	16	2	15	4	39	7	48	8
	30	5	30	5	15	4	34	6	38	7
	24	4	35	6	15	4	30	5	52	9
	37	7	33	6	10	2	30	5	50	9
	28	5	30	5	14	4	42	7	42	7
	41	7	33	6	13	4	32	6	47	8
	32	6	34	6	13	4	38	7	44	8
	28	5	19	3	11	3	29	5	53	9
	42	7	27	5	20	6	31	5	43	7
	33	6	24	4	20	6	45	8	43	7
	28	5	21	3	13	4	31	5	48	8
	36	6	20	3	15	4	39	7	32	6
	33	6	23	4	15	4	34	6	43	7
	17	2	20	3	14	4			49	9
	29	5	17	2	20	6			37	7
	47	8	29	5					50	9
	18	2	23	4					44	8
	34	6	9	1					45	8
	31	5								
	27	5								
	29	5								
	39	7								

TABLE 3.—Continued

	Classes — Cell-8									
	F. of $F._{16}$		F. of $F._{18}$		F. of $F._{17}$		C. $U.S.A._{20}$		F. of $F._{19}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	14.6	4.09	10.6	2.47	16.4	4.68	28.2	4.78	26.5	7.36
	12	3	9	2	15	4	28	5	28	8
	15	4	13	4	15	4	16	2	20	6
	16	5	10	2	16	5	23	4	18	5
	13	4	15	4	21	6	37	7	20	6
	13	4	12	3	9	2	29	5	29	8
	18	5	10	2	15	4	29	5	31	9
	19	6	12	3	19	6	34	6	31	9
	14	4	14	4	12	3	36	6	29	8
	24	7	5	0	12	3	33	6	33	10
	10	2	9	2	22	6	19	3	28	8
	15	4	12	3	16	5	47	8	25	7
	14	4	9	2	11	3	24	4	28	8
	9	2	12	3	19	6	25	4	26	7
	10	2	7	1	20	6	32	6	23	7
	17	5	10	2	18	5	24	4	31	9
	14	4	13	4	19	6	24	4	29	8
	14	4	8	1	13	4	24	4	29	8
	15	4			21	6	43	7	27	8
	14	4			20	6	23	4	30	8
	17	5			15	4	37	7	32	9
	14	4			18	5	23	4	30	8
	9	2			15	4	33	6	28	8
	19	6			15	4	24	4	25	7
	15	4			10	2	44	8	27	8
	12	3			24	7	25	4	24	7
	19	6			17	5	23	4	30	8
	11	3			22	6	36	6	25	7
	12	3			16	5	25	4	29	8
	12	3			19	6	15	2	26	7
	19	6			20	6	34	6	23	7
	14	4			12	3	26	4	21	6
	17	5			13	4	19	3	19	6
	14	4			15	4	26	4	15	4
					13	4	11	1	33	10
							37	7		
							26	4		
							29	5		

TABLE 3.—Continued

	Classes — Cell-9									
	F. of $F._{20}$		C. $U.S.A._{21}$		F. of $F._{21}$		C. $U.S.A._{22}$		F. of $F._{22}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	20.0	5.83	29.9	5.14	15.4	4.38	33.1	5.71	14.1	3.92
	21	6	31	5	13	4	32	6	6	0
	20	6	26	4	21	6	22	4	10	2
	22	6	30	5	18	5	42	7	19	6
	17	5	33	6	12	3	29	5	18	5
	19	6	31	5	20	6	30	5	17	5
	21	6	37	7	20	6	40	7	16	5
	31	9	33	6	16	5	44	8	12	3
	26	7	26	4	19	6	23	4	14	4
	23	7	26	4	17	5	27	5	13	4
	23	7	38	7	19	6	29	5	16	5
	19	6	22	3	12	3	33	6	16	5
	24	7	25	4	8	1	26	4	16	5
	13	4	32	6	22	6	45	8	10	2
	20	6	29	5	13	4	31	5	12	3
	25	7	25	4	12	3	37	7	17	5
	22	6	33	6	10	2	37	7	11	3
	21	6	29	5	17	5	34	6	12	3
	21	6	28	5	20	6	33	6	18	5
	30	8	32	6	11	3	29	5	17	5
	16	5	29	5	20	6	26	4	12	3
	26	8	34	6	10	2	17	2	9	2
	22	6			13	4	39	7	14	4
	18	5			7	1	40	7	16	5
	19	6			16	5	47	8	18	5
	18	5			15	4	36	6	13	4
	21	6			15	4	34	6		
	21	6			15	4	38	7		
	25	7			13	4	27	5		
	13	4			17	5	46	8		
	12	3			17	5	43	7		
	16	5			16	5	31	5		
	11	3			17	5	36	6		
	13	4			15	4	34	6		
	13	4			15	4	35	6		
	20	6			19	6	23	4		
					12	3	21	3		
					14	4	31	5		
					19	6	31	5		
					16	5				
					13	4				

TABLE 3.—Continued

	Classes — Cell-10									
	F. of $F._{23}$		C. $U.S.A._{23}$		C. $U.S.A._{25}$		C. $U.S.A._{24}$		C. $U.S.A._{26}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	15.8	4.46	29.5	5.08	23.0	3.67	30.5	5.17	22.6	3.73
	20	6	34	6	22	4	19	3	26	4
	17	5	26	4	19	3	32	6	14	1
	22	6	35	6	20	3	20	3	22	4
	15	4	20	3	20	3	22	4	17	2
	22	6	26	4	28	5	38	7	27	5
	11	3	41	7	19	3	24	4	26	4
	23	7	37	7	23	4	37	7	23	4
	17	5	37	7	25	4	35	6	23	4
	10	2	34	6	22	4	29	5	23	4
	9	2	31	5	31	5	42	7	24	4
	12	3	39	7	31	5	40	7	27	5
	16	5	25	4	16	2	21	3	22	4
	12	3	28	5	18	2	31	5	25	4
	16	5	39	7	25	4	29	5	28	5
	16	5	38	7	23	4	30	5	16	2
	17	5	22	4	24	4	34	6	22	4
	22	6	25	4	26	4	48	8	27	5
	17	5	23	4	20	3	46	8	26	4
	12	3	31	5	31	5	35	6	17	2
	20	6	24	4	21	3	23	4	20	3
	13	4	32	6	19	3	35	6	16	2
	14	4	34	6			50	9	23	4
	14	4	38	7			20	3	24	4
	11	3	20	3			36	6	19	3
			22	4			12	1	21	3
			19	3			20	3	25	4
			28	5			23	4	23	4
			23	4			25	4	24	4
			42	7			17	2	24	4
			41	7			28	5	28	5
			32	6			28	5	21	3
			20	3			34	6	27	5
			23	4			29	5	23	4
			24	4			29	5		
			22	4			47	8		
			25	4			29	5		

TABLE 3.—Continued

	Classes — Cell-11									
	C. U.S.A.$_{28}$		C. U.S.A.$_{29}$		C. U.S.A.$_{30}$		C. U.S.A.$_{27}$		F. of F.$_{24}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	49.2	8.69	26.9	4.64	34.7	5.94	29.0	4.95	25.7	7.19
	47	8	30	5	40	7	25	4	24	7
	51	9	27	5	47	8	27	5	24	7
	34	10	17	2	41	7	24	4	24	7
	42	7	28	5	41	7	26	4	24	7
	53	9	29	5	43	7	32	6	30	8
	49	9	31	5	46	8	29	5	18	5
	37	7	28	5	43	7	17	2	25	7
	51	9	28	5	33	6	28	5	30	8
	38	7	29	5	40	7	35	6	29	8
			23	4	45	8	34	6	27	8
	48	8								
	39	7	26	4	33	6	34	6	24	7
	52	9	19	3	41	7	31	5	9	2
	50	9	25	4	25	4	31	5	30	8
	50	9	34	6	20	3	29	5	27	8
	53	9	28	5	30	5	30	5	20	6
	50	9	28	5	40	7	35	6	25	7
	50	9	27	5	37	7	28	5	30	8
	50	9	24	4	36	6	28	5	30	8
	50	9	30	5	32	6	28	5	29	8
			29	5	44	8			29	8
	51	9								
	50	9	24	4	20	3			30	8
	48	8	29	5	16	2			14	4
	53	9	25	4	27	5			19	6
	50	9	27	5	22	4			27	7
	58	10	22	4	44	8			31	9
			23	4	38	7			31	9
			32	6	43	7			32	9
			32	6	37	7			31	9
					39	7			31	9
					36	6			26	7
					13	1			13	4
					17	2				

TABLE 3.—Continued

	Classes — Cell-12									
	C. U.S.A.$_{33}$		F. of F.$_{25}$		C. U.S.A.$_{31}$		C. U.S.A.$_{34}$		C. U.S.A.$_{32}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	27.2	4.50	20.2	5.70	28.0	4.75	32.1	5.66	45.3	8.00
	22	4	24	7	29	5	38	7	54	10
	39	7	9	2	31	5	20	3	40	7
	21	3	23	7	25	4	37	7 3	38	7
	40	7	25	7	30	5	38	7	55	10
	36	6	17	5	29	5	35	6	13	1
	37	7	22	6	27	5	24	4	48	8
	26	4	16	5	24	4	27	5	32	6
	8	0	17	5	24	4	40	7	54	10
	12	1	25	7	29	5	25	4	56	10
	20	3	31	9	30	5	29	5	49	9
	34	6	26	7	24	4	38	7	54	10
	24	4	20	6	24	4	32	6	54	10
	13	1	22	6	27	5	22	4	30	5
	18	2	9	2	23	4	46	8	52	9
	30	5	24	7	22	4	37	7	35	6
	35	6	14	4	30	5	33	6	48	8
	28	5	23	7	26	4	28	5	45	8
	36	6	22	6	30	5	41	7	39	7
	15	2	27	8	36	6	27	5	54	10
	34	6	20	6	27	5	36	6	36	6
	29	5	18	5	30	5	32	6	54	10
	23	4	21	6	28	5	24	4	46	8
	23	4	22	6	29	5	33	6	53	9
	23	4	22	6	33	6	19	3	47	8
	38	7	25	7	30	5	24	4	47	8
	27	5	9	1	28	5	33	6	56	10
	29	5	16	5	26	4	24	4	41	7
	36	6	30	8	32	6	48	8	56	10
	23	4	16	5	33	6	42	7	39	7
	36	6	21	6	28	5			44	8
			17	5	29	5			45	8
			15	4	25	4			36	6
			17	5	29	5				
					23	4				
					32	6				
					36	6				
					30	5				
					32	6				
					25	4				
					10	0				

TABLE 3.—Continued

	Classes — Cell-13									
	F. of $F._{27}$		C. U.S.A.$_{36}$		C. U.S.A.$_{37}$		C. U.S.A.$_{35}$		F. of $F._{26}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	13.4	3.63	31.7	5.30	24.9	4.09	29.2	4.94	16.5	4.68
	21	6	39	7	31	5	31	5	14	4
	12	3	41	7	25	4	28	4	16	5
	17	5	47	8	18	2	29	5	14	4
	17	5	30	5	23	4	24	4	14	4
	15	4	21	3	24	4	42	7	16	5
	11	3	35	6	28	5	22	4	12	3
	12	3	19	3	26	4	31	5	13	4
	15	4	17	2	31	5	21	3	17	5
	11	3	26	4	32	6	32	6	15	4
	15	4	27	5	17	2	36	6	12	3
	9	2	29	5	28	5	28	5	25	7
	12	3	11	1	36	6	35	6	21	6
	12	3	42	7	29	5	34	6	14	4
	12	3	31	5	24	4	41	7	15	4
	11	3	40	7	16	2	41	7	22	6
	16	5	49	9	27	5	29	5	15	4
	11	3	43	7	25	4	17	2	17	5
	10	2	45	8	19	3	18	2	17	5
	11	3	26	4	23	4	28	5	17	5
	19	6	31	5	26	4	26	4	24	7
	8	1	25	4	15	2	27	5	26	7
	14	4	33	6	22	4	15	2	21	6
	14	4	47	8	17	2	27	5	14	4
	11	3	31	5	23	4	34	6	21	6
	17	5	13	1	21	3	27	5	16	5
	14	4	32	6	24	4	31	5	18	5
	14	4	36	6	23	4	34	6	13	4
			34	6	29	5	28	5	18	5
			32	6	30	5	32	6	22	6
			40	7	28	5	25	4	7	1
			24	4	16	2	21	3	11	3
			11	1	27	5	37	7	15	4
			38	7	28	5	33	6	14	4
					34	6			16	5

TABLE 3.—Continued

	Classes — Cell-14									
	F. of F.$_{29}$		F. of F.$_{30}$		C. U.S.A.$_{39}$		F. of F.$_{28}$		C. U.S.A.$_{38}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	19.1	5.45	15.7	4.34	32.3	5.57	16.7	4.92	20.9	3.04
	22	6	22	6	25	4	18	5	44	8
	26	7	12	3	34	6	19	6	45	8
	29	8	22	6	31	5	15	4	22	4
	13	4	18	5	41	7	11	3	19	3
	26	7	16	5	30	5	16	5	19	3
	24	7	16	5	38	7	15	4	18	2
	13	4	17	5	33	6	13	4	21	3
	16	5	13	4	35	6	20	6	23	4
	18	5	16	5	30	5	15	4	29	5
	17	5	15	4	31	5	17	5	31	5
	16	5	21	6	42	7	20	6	7	0
	11	3	21	6	39	7	20	6	15	2
	22	6	13	4	34	6	19	6	17	2
	16	5	14	4	37	7	19	6	34	6
	25	7	18	5	30	5	16	5	19	3
	22	6	10	2	31	5	15	4	11	1
	21	6	8	1	32	6	18	5	10	0
	19	6	14	4	30	5	23	7	16	2
	14	4	17	5	37	7	17	5	11	1
	12	3	12	3	33	6	18	5	13	1
	17	5	7	1	25	4	20	6	35	6
	15	4	15	4	29	5	18	5	15	2
	23	7	15	4	16	2	18	5	10	0
	13	4	16	5			12	3	26	4
	10	2	14	4			19	6	26	4
	22	6	26	7			13	4	5	0
	18	5	14	4			14	4		
	27	8	18	5			18	5		
	27	8	19	6			17	5		
			17	5			12	3		
			6	0			19	6		
			20	4			13	4		
							19	6		
							16	5		
							16	5		
							13	4		

TABLE 3.—Continued

	Classes — Cell-15									
	C. U.S.A.$_{42}$		F. of F.$_{31}$		C. U.S.A.$_{41}$		C. U.S.A.$_{40}$		C. U.S.A.$_{43}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	27.0	4.48	22.0	6.32	30.7	5.41	37.7	6.57	44.3	7.81
	24	4	16	5	32	6	49	9	44	8
	18	2	22	6	29	5	45	8	40	7
	29	5	24	7	32	6	45	8	44	8
	27	5	28	8	34	6	30	5	44	8
	30	5	28	8	26	5	38	7	29	5
	40	7	28	8	28	5	33	6	46	8
	36	6	12	3	36	6	35	6	50	9
	28	5	11	3	39	7	37	7	47	8
	19	3	16	5	29	5	19	3	31	5
	30	5	12	3	29	5	46	8	52	9
	22	4	23	7	30	5	44	8	50	9
	21	3	21	6	35	6	39	7	42	7
	24	4	28	8	27	5	46	8	44	8
	17	2	16	5	29	5	48	8	57	10
	16	2	25	7	28	5	35	6	48	8
	40	7	23	7	28	5	23	4	44	8
	25	4	24	7	31	5	37	7	43	7
	22	4	21	6			43	7	55	10
	28	5	29	3			40	7	44	8
	29	5	21	6			41	7	38	7
	29	5	22	6			18	2	38	7
	33	6	27	8					46	8
	35	6	18	5					34	6
	25	4	21	6					45	8
	20	3	28	8					34	6
	29	5	17	5					43	7
	29	5	28	8					55	10
	31	5	23	7					38	7
	31	5	13	4					41	7
	29	5	25	7					54	10
	28	5	29	8					53	9
	19	3	12	3						
	26	4	20	6						
			20	6						
			26	7						
			23	7						
			21	6						
			33	10						

TABLE 3.—Continued

	Classes — Cell-16									
	F. of F.32		C. U.S.A.45		C. U.S.A.47		C. U.S.A.44		C. U.S.A.46	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	26.4	7.52	32.2	5.48	29.7	5.03	21.0	3.19	26.2	4.35
	21	6	21	3	40	7	30	5	22	4
	21	6	23	4	31	5	20	3	32	6
	31	9	28	5	33	6	39	7	21	3
	29	8	25	4	21	3	27	5	25	4
	29	8	42	7	27	5	28	5	30	5
	33	10	36	6	31	5	15	2	26	4
	23	7	26	4	31	5	21	3	26	4
	32	9	24	4	23	4	10	0	21	3
	26	7	43	7	44	8	16	2	28	5
	25	7	37	7	31	5	16	2	21	3
	31	9	42	7	31	5	35	6	26	4
	21	6	31	5	42	7	19	3	35	6
	32	9	21	3	35	6	11	1	29	5
	24	7	41	7	25	4	14	1	33	6
	24	7	35	6	23	4	17	2	19	3
	29	8	31	5	39	7	19	3	32	6
	21	6	36	6	27	5	16	2	30	5
	24	7	40	7	40	7	21	3	24	4
	31	9	47	8	31	5	22	4	26	4
	24	7	37	7	32	6	2	4	26	4
	31	9	32	6	21	3	20	3	32	6
	26	7	34	6	24	4	13	1	24	4
	26	7	32	6	33	6	16	2	23	4
	25	7	42	7	32	6	20	3	23	4
	21	6	36	6	27	5	24	4	29	5
			20	3	31	5	33	6	24	4
			27	5	16	2	22	4	32	6
			26	4	16	2	24	4	12	1
			25	4	16	2	32	6	31	5
			33	6	32	6	25	4	26	4
			30	5	23	4	15	2	25	4
			24	4	41	7	23	4		
			37	7			28	5		
							10	0		
							20	3		
							13	1		

TABLE 4.—Class means and pupils' raw and sta-eleven scores on subject-matter tests by classes within cells in the second television experiment

Classes — Cell-1										
	Soc. Stu.28		Soc. Stu.29		Soc. Stu.30		Soc. Stu.31		Soc. Stu.41	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	63.4	4.31	60.1	3.78	61.8	4.00	60.6	3.93	45.7	4.14
	72	6	43	1	68	5	60	4	35	3
	62	4	55	3	58	3	62	4	48	4
	68	5	61	4	58	3	39	1	52	5
	54	2	36	1	52	2	59	3	48	4
	69	6	70	6	59	3	62	4	39	3
	60	4	61	4	66	5	71	6	44	4
	62	4	54	2	55	3	53	2	48	4
	63	4	56	3	54	2	65	5	44	4
	65	5	61	4	47	2	60	4	37	3
	51	2	64	4	70	6	71	6	31	2
	79	8	59	3	65	5	72	6	43	4
	65	5	56	3	66	5	55	3	52	5
	67	5	64	4	49	2	68	5	47	4
	62	4	62	4	67	5		3	45	4
	67	5	55	3	66	5	69	6	51	5
	72	6	61	4	70	6	67	5	28	2
	62	4	50	2	59	3	64	4	47	4
	56	3	54	2	67	5	77	7	61	7
	57	3	59	3	68	5	59	3	53	5
	58	3	57	3	59	3	65	5	53	5
	53	2	62	4	61	4	58	3	54	6
	63	4	50	2	66	5	68	5		
	61	4	62	4	64	4	68	5		
	73	6	55	3	64	4	75	7		
	59	3	62	4	57	3	54	2		
	67	5	62	4	71	6	51	2		
	54	2	70	6			45	1		
	66	5	72	6			24	0		
	72	6	72	6			59	3		
			63	4						
			74	7						
			55	3						
			60	4						
			68	5						
			60	4						
			77	7						
			63	4						

TABLE 4.—Continued.

Classes — Cell-2										
	El. Sci.39		El. Sci.40		Soc. Stu.25		Soc. Stu.26		Soc. Stu.27	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	47.0	4.38	57.4	7.24	71.5	6.16	58.9	3.54	60.6	3.88
	57	6	60	7	76	7	67	5	61	4
	52	5	59	7	61	4	50	2	54	2
	59	7	65	8	67	5	62	4	71	6
	42	4	63	8	74	7	64	4	69	6
	51	5	60	7	68	5	50	2	55	3
	37	3	58	6	70	6	77	7	62	4
	53	5	65	8	73	6	44	1	64	4
	57	6	64	8	71	6	71	6	55	3
	52	5	61	7	72	6	56	3	60	4
	37	3	65	8	67	5	57	3	73	6
	28	2	54	6	64	4	64	4	52	2
	46	4	66	9	76	7	71	6	67	5
	39	3	63	8	69	6	57	3	41	1
	43	4	61	7	61	4	43	1	66	5
	48	4	49	5	76	7	57	3	58	3
	53	5	68	9	69	6	59	3	58	3
	31	2	53	5	73	6	62	4	64	4
	43	4			74	7	27	0	60	4
	55	6			71	6	70	6	50	2
	43	4			65	5	59	3	58	3
	50	5			82	9	72	6	49	2
	36	3			70	6	57	3	66	5
	53	5			75	7	53	2	60	4
	41	3			74	7	57	3	65	5
	52	5			74	7	62	4	74	7
	52	5			79	8	64	4	63	4
	44	4			75	7	61	4		
	48	4			74	7	56	3		
	54	6			67	5				
	48	4			72	6				
	49	5								
	40	3			70	6				
	47	4			71	6				
	57	6			77	7				
					64	4				
					71	6				
					76	7				
					77	7				
					68	5				
					76	7				
					75	7				

TABLE 4.—Continued.

Classes — Cell-3										
	Chemistry$_4$		El. Sci.$_{35}$		El. Sci.$_{36}$		El. Sci.$_{37}$		El. Sci.$_{38}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	21.5	3.70	41.4	3.59	59.2	6.97	53.8	5.56	38.9	3.50
	32	6	18	1	64	8	54	6	35	3
	24	4	42	4	67	9	52	5	34	3
	22	4	25	2	66	9	49	5	39	3
	24	4	36	3	65	8	57	6	21	1
	21	4	17	1	60	7	41	3	32	2
	23	4	33	3	44	4	59	7	46	4
	15	2	30	2	57	6	55	6	51	5
	17	3	27	2	56	6	51	5	42	4
	21	4	40	3	49	5	53	5	53	5
	22	4	35	3	59	7	33	3	32	2
	25	5	35	3	64	8	59	7	37	3
	17	3	51	5	54	6	50	5	23	2
	27	5	39	3	58	6	61	7	45	4
	26	5	38	3	48	4	44	4	27	2
	15	2	47	4	55	6	58	6	48	4
	15	2	42	4	59	7	52	5	25	2
	13	0	41	3	56	6	46	4	25	2
	23	4	49	5	64	8	62	7	54	6
	32	6	47	4	65	8	57	6	50	5
	20	3	48	4	66	9	54	6	60	7
			48	4	64	8	53	5	24	2
			39	3	67	9	61	7	29	2
			48	4	55	6	53	5	26	2
			48	4	68	9	58	6	30	2
			41	3	59	7	60	7	29	2
			57	6	64	8	47	4	59	7
			45	4	62	7	51	5	50	5
			41	3	50	5	57	6	48	4
			58	6	69	10	48	4	15	1
			60	7	55	6	61	7	54	6
			48	4	62	7	58	6	51	5
			53	5	55	6	57	6	50	5
					49	5	56	6		
							62	7		

TABLE 4.—Continued.

	Classes — Cell-4									
	Soc. Stu.$_{23}$		Soc. Stu.$_{24}$		El. Sci.$_{32}$		El. Sci.$_{33}$		El. Sci.$_{34}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	66.7	5.18	67.7	5.28	49.3	4.94	47.2	4.50	49.5	4.92
	78	8	67	5	44	4	48	4	54	6
	72	6	72	6	62	7	46	4	39	3
	70	6	68	5	42	4	45	4	55	6
	64	4	67	5	51	5	54	6	40	3
	35	1	62	4	44	4	42	4	45	4
	54	2	71	6	58	6	52	5	50	5
	59	3	78	8	59	7	33	3	52	5
	73	6	68	5	54	6	37	3	53	5
	67	5	68	5	56	6	42	4	47	4
	66	5	65	5	51	5	42	4	42	4
	80	8	65	5	62	7	48	4	46	4
	68	5	71	6	38	3	46	4	61	7
	72	6	77	7	64	8	52	5	55	6
	65	5	71	6	27	2	48	4	41	3
	68	5	58	3	54	6	52	5	54	6
	59	3	69	6	58	6	51	5	48	4
	65	5	65	5	51	5	21	1	45	4
	71	6	57	3	53	5	53	5	63	8
	66	5			47	4	46	4	49	5
	60	4			33	3	59	7	60	7
	71	6			52	5	53	5	62	7
	70	6			48	4	54	6	55	6
	74	7			47	4	40	3	37	3
	69	6			49	5	41	3	34	3
	65	5			54	6	60	7		
	65	5			55	6	53	5		
	65	5			29	2	45	4		
	72	6			59	7	60	7		
	65	5			52	5	46	4		
	59	3			30	2	56	6		
	81	9			53	5	49	5		
	66	5			38	3	41	3		
	63	4			60	7	32	2		
	73	6			43	4	56	6		
							43	4		
							51	5		
							36	4		
							61	7		

TABLE 4.—Continued.

Classes — Cell-5										
	Chemistry$_3$		El. Sci.$_{29}$		El. Sci.$_{30}$		El. Sci.$_{31}$		Soc. Stu.$_{22}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	33.1	6.81	50.0	5.03	37.6	3.47	45.1	4.10	62.4	4.15
	41	10	58	6	21	1	46	4	72	6
	34	7	52	5	39	3	42	4	64	4
	30	6	51	5	11	0	38	3	47	2
	32	6	55	6	20	1	47	4	66	5
	30	6	44	4	22	2	60	7	58	3
	32	6	36	3	19	1	29	2	62	4
	40	9	40	3	7	0	33	3	54	2
	33	7	51	5	49	5	60	7	60	4
	28	5	43	4	50	5	44	4	68	5
	28	5	63	8	43	4	47	4	72	6
	32	6	62	7	25	2	38	3	61	4
	24	4	59	7	51	5	27	2	57	3
	36	8	57	6	40	3	41	3	57	3
	40	9	53	5	34	3	47	4	69	6
	40	9	50	5	41	3	58	6	68	5
	31	6	49	5	9	0	28	2	68	5
			40	3	38	3	57	6	49	2
			61	7	13	0	53	5	58	3
			51	5	48	4	41	3	70	6
			25	2	63	8	45	4	67	5
			51	5	10	0	40	3		
			40	3	39	3	49	5		
			30	2	61	7	47	4		
			56	6	54	6	41	3		
			45	4	57	6	40	3		
			59	7	61	7	47	4		
			52	5	55	6	46	4		
			58	6	48	6	62	7		
			60	7	63	8	50	5		
			49	5	43	4	49	5		
			50	5	52	5				
					21	1				
					44	4				
					50	5				
					44	4				
					27	2				
					52	5				
					14	0				

TABLE 4.—Continued.

Classes — Cell-6										
	Soc. Stu.$_{20}$		Soc. Stu.$_{21}$		El. Sci.$_{26}$		El. Sci.$_{27}$		El. Sci.$_{28}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	64.1	4.61	62.0	4.21	22.6	1.58	55.2	5.89	50.7	5.20
	61	4	57	3	21	1	48	4	50	5
	69	6	67	5	20	1	70	10	47	4
	52	2	60	4	30	2	60	7	45	4
	60	4	29	0	20	1	52	5	52	5
	72	6	50	2	18	1	61	7	48	4
	61	4	54	2	51	5	67	9	46	4
	62	4	72	6	26	2	58	6	54	6
	57	3	74	7	22	2	60	7	57	6
	67	5	74	7	15	1	63	8	38	3
	75	7	51	2	23	2	61	7	60	7
	68	5	69	6	33	3	59	7	42	4
	55	3	57	3	25	2	57	6	36	3
	48	2	74	7	21	1	57	6	63	8
	64	4	68	5	34	3	53	5	56	6
	56	3	59	3	36	3	47	4	63	8
	79	8	72	6	39	3	53	5	42	4
	62	4	53	2	18	1	47	4	56	6
	68	5	68	5	14	0	57	4	34	3
	70	6	67	5	6	0	43	4	47	4
	74	7			15	1	47	4	49	5
	67	5			22	2	63	8	53	5
	68	5			18	1	50	5	50	5
	69	6			28	2	62	7	50	5
	61	4			15	1	55	6	44	4
	56	3			27	2	61	7	49	5
	68	5			15	1	52	5	55	6
	44	1			10	0	37	3	59	7
	71	6			10	0	67	9	54	6
	61	4			22	2	52	5	62	7
	69	6			39	3	56	6	60	7
	66	5			19	1	55	6		
	77	7			23	2	51	5		
	59	3			29	2	62	7		
					20	1	44	4		
					38	3	38	3		
					5	0	61	7		
					5	0				
					25	2				

TABLE 4.—Continued.

Classes — Cell-7										
	Soc. Stu.$_{18}$		Soc. Stu.$_{19}$		El. Sci.$_{24}$		El. Sci.$_{25}$			
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	81.6	9.06	55.5	3.11	45.4	4.35	49.9	4.97		
	83	10	44	1	48	4	51	5		
	82	9	61	4	27	2	57	6		
	82	9	63	4	37	3	51	5		
	83	10	59	3	43	4	57	6		
	83	10	70	6	36	3	54	6		
	80	8	69	6	49	5	55	6		
	81	9	69	6	42	4	20	1		
	82	9	41	1	52	5	37	3		
	82	9	47	2	50	5	36	3		
	78	8	58	3	63	8	50	5		
	80	8	55	3	31	2	58	6		
	83	10	57	3	59	7	45	4		
	83	10	64	4	65	8	62	7		
	82	9	53	2	44	4	49	5		
	81	9	50	2	33	3	49	5		
	81	9	68	5	54	6	58	6		
	80	8	51	2	37	3	65	8		
	82	9	60	4	42	4	54	6		
	82	9	70	6	51	5	56	6		
	80	8	42	1	51	5	47	4		
	81	9	42	1	35	3	58	6		
	80	8	32	0	48	4	42	4		
	82	9	32	0	50	5	53	5		
	80	8	54	2	30	2	54	6		
	84	10	57	3	50	5	53	5		
	83	10	61	4	54	6	51	5		
	83	10	69	6	38	3	38	3		
	82	9			26	2	45	4		
	83	10			53	5	51	5		
	81	9			50	5	54	6		
	82	9			53	5	47	4		
					50	5	45	4		
					38	3	46	4		
					51	5				

TABLE 4.—Continued.

Classes — Cell-8										
	El. Sci.$_{20}$		El. Sci.$_{21}$		El. Sci.$_{22}$		El. Sci.$_{23}$		Soc. Stu.$_{17}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	48.7	4.68	25.5	1.76	53.2	6.40	58.3	6.67	63.8	4.44
	45	4	18	1	63	8	65	8	57	3
	40	3	22	2	62	7	62	7	75	7
	47	4	18	1	59	7	65	8	67	5
	49	5	20	1	54	6	28	2	59	3
	53	5	32	2	63	8	48	4	69	6
	48	4	43	4	69	10	55	6	66	5
	56	6	29	2	59	7	54	6	71	6
	56	6	27	2	59	7	64	8	68	5
	51	5	24	2	60	7	64	8	55	3
	46	4	36	3	50	5	58	6	67	5
	56	6	19	1	59	7	61	7	65	5
	57	6	14	0	56	6	51	5	60	4
	43	4	19	1	64	8	51	5	60	4
	53	5	36	3	49	5	54	6	71	6
	35	3	28	2	61	7	53	5	60	4
	32	2	19	1	52	5	66	9	59	3
	46	4	36	3	60	7	64	8	74	7
	64	8	30	2	59	7	56	6	57	3
	48	4	24	2	52	5	68	9	62	4
	50	5	27	2	56	6	51	5	58	3
	58	6	35	3	56	6	68	9	61	4
	37	3	34	3	64	8	67	9	56	3
	42	4	29	2	47	4	53	5	71	6
	62	7	32	2	41	4	58	6	71	6
	43	4	13	0	58	6	68	9	59	3
			32	2	52	5	62	7	54	2
			11	0	63	8	60	7	71	6
			22	2	50	5	63	8	58	3
			11	0	47	4	60	7	62	4
					61	7	51	5	59	3
									77	7
									64	4

TABLE 4.—Continued.

	Classes — Cell-9									
	Soc. Stu.$_{15}$		Soc. Stu.$_{16}$		El. Sci.$_{19}$		Chemistry$_{2}$		U.S. History$_{1}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	68.8	5.66	56.0	3.48	52.8	5.58	28.3	5.41	31.1	5.00
	80	8	60	4	57	6	17	3	31	.1
	68	5	61	4	34	3	30	6	19	12.1
	74	7	61	4	50	5	16	2	35	3.9
	53	2	59	3	26	2	24	4	42	10.9
	78	8	60	4	55	6	33	7	38	6.9
	78	8	74	7	61	7	24	4	25	6.1
	63	4	40	1	59	7	18	3	14	17.1
	71	6	58	3	53	5	24	4	28	3.1
	77	7	68	5	51	5	29	5	36	4.9
	79	8	62	4	48	4	24	4	35	3.9
	80	8	58	3	60	7	35	8	35	3.9
	80	8	63	4	54	6	26	5	38	6.9
	81	9	56	3	65	8	29	5	31	.1
	77	7	61	4	52	5	27	5	19	12.1
	70	6	54	2	50	5	29	5	38	6.9
	80	8	66	5	55	6	28	5	44	12.9
	62	4	57	3	49	5	32	6	33	1.9
	63	4	47	2	67	9	30	6	32	.9
	82	9	55	3	53	5	29	5	30	1.1
	80	8	75	7	55	6	33	7	31	.1
	60	4	47	2	61	7	39	8	25	6.1
	72	6	71	6	48	4	35	8	43	11.9
	63	4	59	3	64	8	33	7	23	8.1
	80	8	37	1	46	4	31	6	28	3.1
	60	4	57	3	41	3	31	6	24	7.1
	45	1	56	3	60	7	24	4	39	7.9
	52	2	37	1			35	8	20	11.1
	56	3	46	1					26	5.1
	62	4	70	6					28	3.1
	69	6							42	10.9
	57	3								
	52	2								

TABLE 4.—Continued.

Classes — Cell-10										
	Soc. Stu.$_{14}$		Soc. Stu.$_{15}$		Soc. Stu.$_{16}$		Soc. Stu.$_{17}$		El. Sci.$_{18}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	62.4	4.17	45.8	4.14	48.0	4.39	67.3	4.89	39.0	3.33
	58	3	45	4	47	4	48	4	36	3
	62	4	41	3	49	5	57	6	30	2
	58	3	39	3	44	4	47	4	38	3
	48	2	57	6	58	6	59	7	41	3
	63	4	51	5	46	4	35	3	41	3
	67	5	52	5	39	3	55	6	44	4
	74	7	40	3	48	4	45	4	31	2
	67	5	45	4	52	5	45	4	44	4
	57	3	37	3	38	3	57	6	48	4
	66	5	51	5	48	4	57	6	33	3
	71	6	60	7	48	4	59	7	23	2
	73	6	46	4	32	2	43	4	42	4
	54	2	42	4	51	5	51	5	37	3
	59	3	41	3	47	4	48	4	42	4
	61	4	42	4	40	3	40	3	43	4
	65	5	48	4	40	3	50	5	46	4
	57	3	39	3	37	3	62	7	34	3
	72	6	47	4	52	5	58	6	48	4
	51	2	58	6	53	5	50	5	23	2
	69	6	43	4	49	5	55	6	50	5
	62	4	45	4	58	6	58	6	45	4
	70	6	50	5	58	6	60	7		
	72	6	48	4	53	5	51	5		
	69	6	43	4	51	5	53	5		
	58	3	40	3	51	5	51	5		
	60	4	45	4	52	5	34	3		
	68	5	50	5	49	5	42	4		
	68	5	37	3	48	4	51	5		
	57	3	51	5	45	4	62	7		
	47	2	45	4	52	5	56	6		
	56	3	49	5	53	5	55	6		
	72	6	42	4	56	6	64	8		
	61	4	47	4	40	3	22	2		
	54	2	46	4			26	2		
	53	2	41	3			21	1		
	68	5	47	4			25	2		
			44	4						

TABLE 4.—Continued.

Classes — Cell-11										
	Soc. Stu.$_9$		Soc. Stu.$_{10}$		Soc. Stu.$_{11}$		Soc. Stu.$_{12}$		Soc. Stu.$_{13}$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	73.0	6.52	71.3	6.19	54.1	2.85	67.6	5.25	69.7	5.83
	66	5	75	7	58	3	67	5	75	7
	77	7	65	5	61	4	65	5	78	8
	74	7	47	2	65	5	51	2	62	4
	67	5	65	5	59	3	62	4	78	8
	78	8	79	8	50	2	73	6	77	7
	75	7	75	7	59	3	71	6	82	9
	78	8	67	5	60	4	67	5	71	6
	75	7	75	7	62	4	66	5	75	7
	76	7	78	8	49	2	74	7	60	4
	65	5	74	7	52	2	69	6	72	6
	76	7	72	6	60	4	73	6	48	2
	58	3	75	7	36	1	67	5	72	6
	76	7	79	8	32	0	65	5	74	7
	78	8	77	7			61	4	78	8
	77	7	77	7			73	6	72	6
	79	8	79	8			72	6	72	6
	76	7	78	8			70	6	63	4
	72	6	79	8			72	6	77	7
	62	4	68	5			63	4	62	4
	80	8	63	4			71	6	57	3
	75	7	67	5					76	7
	71	6	60	4					77	7
	70	6	70	6					78	8
	76	7	75	7					74	7
	69	6	80	8					58	3
	75	7	65	5					61	4
	72	6	71	6					58	3
	69	6	72	6					78	8
	77	7	65	5					63	4
	75	7	73	6					65	5
	78	8	79	8						
	62	4	59	3						
	75	7								

TABLE 4.—Continued.

Classes — Cell-12										
	El. Sci.$_{12}$		El. Sci.$_{13}$		El. Sci.$_{14}$		Soc. Stu.$_{8}$			
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	50.6	5.31	54.0	5.70	61.3	7.50	74.2	7.10		
	55	6	60	7	62	7	79	8		
	44	4	63	8	65	8	72	6		
	63	8	56	6	69	10	81	9		
	53	5	52	5	53	5	66	5		
	52	5	61	7	71	10	76	7		
	50	5	44	4	57	6	57	3		
	52	5	56	6	67	9	69	6		
	42	4	30	2	57	6	69	6		
	52	5	65	8	61	7	75	7		
	43	4	63	8	53	5	66	5		
	56	6	53	5	69	10	74	7		
	45	4	49	5	55	6	76	7		
	68	9	60	7	52	5	74	7		
	35	3	64	8	70	10	75	7		
	63	8	66	9	69	10	80	8		
	21	1	39	3	65	8	70	6		
	54	6	53	5	47	4	75	7		
	29	2	52	5	36	3	80	8		
	46	4	53	5	64	8	77	7		
	54	6	55	6	52	5	74	7		
	42	4	53	5	69	10	78	8		
	61	7	53	5	60	7	81	9		
	61	7	54	6	66	9	80	8		
	51	5	52	5	64	8	79	8		
	52	5	58	6	69	10	77	7		
	63	8	56	6	62	7	80	8		
	33	3	52	5	68	9	83	10		
	57	6	50	5	66	9	77	7		
	44	4	47	4	62	7	80	8		
	60	7	51	5	65	8	76	7		
	63	8			54	6				
	54	6			64	8				

TABLE 4.—Continued.

	Classes — Cell-13									
	Chemistry$_1$		Soc. Stu.$_4$		Soc. Stu.$_5$		Soc. Stu.$_6$		Soc. Stu.$_7$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	19.3	3.00	58.5	3.65	63.7	4.59	63.9	4.67	73.6	6.70
	26	5	27	0	71	6	61	4	70	6
	14	1	48	2	60	4	75	7	74	7
	16	2	63	4	58	3	75	7	69	6
	16	2	62	4	79	8	80	8	74	7
	23	4	61	4	75	7	53	2	76	7
	23	4	67	5	69	6	72	6	66	5
	20	3	38	1	64	4	65	5	75	7
	17	3	66	5	66	5	68	5	75	7
			59	3	81	9	67	5	74	7
			60	4	77	7	75	7	79	8
			63	4	63	4	73	6	68	5
			66	5	58	3	65	5	59	3
			32	0	72	6	66	5	80	8
			66	5	72	6	78	8	82	9
			67	5	55	3	51	2	72	6
			66	5	59	3	77	7	65	5
			62	4	63	4	66	5	70	6
			62	4	60	4	74	7	79	8
			65	5	71	6	62	4	76	7
			57	3	64	4	43	1	79	8
			59	3	72	6	53	2	62	4
			64	4	54	2	22	0	67	5
			58	3	34	0	59	3	73	6
			71	6	67	5	68	5	75	7
			47	2	47	2	66	5	81	9
			66	5	72	6	57	3	82	9
					64	4	69	6	71	6
					71	6	50	2	79	8
					21	0	58	3	75	7
							70	6	80	8
							64	4	77	7
							62	4	72	6
							66	5	74	7

TABLE 4.—Continued.

	Classes — Cell-14									
	$Physics_1$		$El.\ Sci._9$		$El.\ Sci._{10}$		$El.\ Sci._{11}$		$Soc.\ Stu._9$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	31.5	5.00	51.7	5.29	54.1	5.70	55.9	6.17	71.5	6.11
	34	6	47	4	63	8	57	6	74	7
	37	8	39	3	54	6	48	4	72	6
	37	8	62	7	55	6	48	4	73	6
	30	4	58	6	45	4	55	6	56	3
	36	7	45	4	61	7	42	4	63	4
	36	7	39	3	55	6	50	5	79	8
	31	5	47	4	39	3	53	6	68	5
	32	5	54	6	55	6	65	8	77	7
	28	4	55	6	50	5	61	7	67	5
	22	1	56	6	48	4	64	8	68	5
	32	5	65	8	56	6	45	4	72	6
	31	5	54	6	52	5	63	8	72	6
	36	7	52	5	54	6	63	8	77	7
	37	8	45	4	52	5	60	7	80	8
	24	2	46	4	57	6	60	7	75	7
	33	6	46	4	62	7	56	6	79	8
	37	8	52	5	60	7	42	4	72	6
	27	3	58	6	47	4	55	6	79	8
	26	3	47	4	49	5	66	9	61	4
	28	4	47	4	52	5	46	4	77	7
	27	3	55	6	51	5	47	4	79	8
	33	6	50	5	58	6	60	7	70	6
	28	4	66	9	60	7	63	8	75	7
	34	6	63	8	53	5	61	7	67	5
			59	7	52	5	53	5	76	7
			54	6	62	7	61	7	69	6
			45	4	68	9	54	6	70	6
			57	6	52	5	65	8	65	5
			40	3	40	3	68	9	71	6
			36	3	66	9	55	6	77	7
			65	8	52	5	47	4	65	5
					50	5	54	6	61	4
					63	8	62	7	73	6
					52	5	51	5	68	5
					58	6	56	6	77	7
					56	6	58	6	73	6
					45	4			77	7
									71	6

TABLE 4.—Continued.

Classes — Cell-15										
	El. Sci.$_4$		El. Sci.$_5$		El. Sci.$_6$		El. Sci.$_7$		El. Sci.$_8$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	49.3	4.86	47.3	4.55	38.2	3.06	50.9	5.05	51.2	5.11
	48	4	49	5	42	4	37	3	44	4
	28	2	49	5	35	3	28	2	46	4
	62	7	54	6	36	3	60	7	50	5
	33	3	25	2	53	5	55	6	55	6
	54	6	56	6	48	4	59	7	59	7
	49	5	50	5	41	3	43	4	53	5
	37	3	48	4	30	2	53	5	54	6
	48	4	58	6	40	3	53	5	57	6
	56	6	60	7	40	3	53	5	53	5
	56	6	51	5	30	2	51	5	53	5
	51	5	50	5	40	3	52	5	50	5
	52	5	60	7	46	4	50	5	48	4
	56	6	48	4	39	3	47	4	43	4
	54	6	64	8	15	1	52	5	50	5
	52	5	41	3	31	2	53	5	43	4
	43	4	58	6	47	4	62	7	54	6
	57	6	50	5	32	2	52	5	53	5
	56	6	47	4	42	4	61	7	51	5
	53	5	34	3			39	3	57	6
	47	4	48	4			57	6		
	50	5	52	5						
	47	4	47	4						
	30	2	25	2						
	49	5	37	3						
	62	7	46	4						
	50	5	62	7						
	54	6	57	6						
	47	4	32	2						
			30	2						
			48	4						
			30	2						

TABLE 4.—Continued.

	Classes — Cell-16									
	El. Sci.$_1$		El. Sci.$_2$		El. Sci.$_3$		Soc. Stu.$_1$		Soc. Stu.$_2$	
	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11	Raw	Sta-11
M	53.9	5.86	54.6	5.88	61.0	7.34	67.0	5.24	64.6	4.68
	50	5	50	5	68	9	65	5	67	5
	46	4	48	4	31	2	76	7	46	1
	50	5	55	6	67	9	66	5	60	4
	57	6	59	7	68	9	69	6	74	7
	59	7	64	8	61	7	74	7	71	6
	61	7	62	7	65	8	62	4	63	4
	51	5	65	8	64	8	77	7	62	4
	59	7	61	7	48	4	64	4	71	6
	54	6	61	7	55	6	65	5	61	4
	57	6	54	6	56	6	69	6	66	5
	50	5	57	6	69	10	66	5	74	7
	59	7	65	8	59	7	58	3	42	1
	62	7	64	8	63	8	78	8	52	2
	53	5	55	6	66	9	66	5	70	6
			56	6	51	5	64	4	63	4
			39	3	69	10	70	6	62	4
			58	6	63	8	76	7	71	6
			49	5	55	6	45	1	58	3
			39	3	60	7	65	5	74	7
			44	4	55	6	58	3	67	5
			52	5	58	6	76	7	77	7
			55	6	60	7	63	4	68	5
			37	3	67	9	70	6	64	4
			61	7	61	7	64	4	72	6
			56	6	62	7	37	1	61	4
			47	4	60	7	73	6		
			46	4	62	7	78	8		
			54	6	60	7	77	7		
			51	5	61	7	79	8		
			54	6	65	8	70	6		
			59	7	64	8	70	6		
			57	6	64	8	64	4		
			57	6	66	9	62	4		
			66	9	60	7	63	4		
					64	8				
					65	8				
					57	6				
					68	9				

APPENDIX III

An Attitude Scale[1]

Instructions

The planning committee would greatly appreciate your evaluation of this workshop. At the close of the final session, indicate your impression of the entire program by checking the proper statements below. Read all of the items before checking. Check only those statements that describe most accurately your personal reaction to the entire program. This information will be used anonymously, therefore, please do not sign your name.

No.	Item	Md.	S.I.R.
1.	It was one of the most rewarding experiences I have ever had.	1.13	.32
2.	Exactly what I wanted.	1.38	.38
3.	I hope we can have another one in the near future.	2.25	.77
4.	It provided the kind of experience that I can apply to my own situation.	2.77	.75
5.	It helped me personally.	3.40	.83
6.	It solved some problems for me.	4.02	.69
7.	I think it served its purpose.	4.44	.74
8.	It had some merits.	4.96	.42
9.	It was fair.	5.3	.58
10.	It was neither very good nor very poor.	6.02	.36
11.	I was mildly disappointed.	6.78	.37
12.	It was not exactly what I needed.	6.97	.99
13.	It was too general.	7.19	.67
14.	I am not taking any new ideas away.	7.45	.65
15.	It didn't hold my interest.	8.19	.71
16.	It was much too superficial.	8.62	.85
17.	I leave dissatisfied.	9.29	.72
18.	It was very poorly planned.	6.69	.65
19.	I didn't learn a thing.	10.26	.84
20.	It was a complete waste of time.	10.89	.31

Notes:

Column 1 is the number of the item

Column 2 contains the item

Column 3 gives the median value of the item. This is the data used in making the score card.

Column 4 Semi-interquartile range (S.I.R.). When this value is added to and subtracted from the median, it describes the range in which the middle half of the values given by the judges fall.

[1]Russell P. Kropp and Coolie Verner, "An Attitude Scale Technique for Evaluating Meetings," Adult Education, (Summer, 1957), VII, 212-215.

APPENDIX IV

TABLE 1.—Reliability[a] of the subject-matter tests constructed by the studio teachers.

Broadcasting Series	Reliability	
	1959-60	1960-61
Radio		
Oklahoma Heritage	.77	
Cities U.S.A.		82
Footsteps of the Free		87
Television		
Algebra I	.79	
Chemistry	.89	89
Elementary Science (3 grades)	.97	82
High School Mathematics	.92	
Oklahoma History	.92	.92
Physics	.86	.86
Social Studies	.77	.83
U.S. History	.87	.87

[a]The reliability of the tests were calculated by using the odd-even split-half method utilizing the Spearman-Brown formula in order to obtain the coefficient of reliability for the full test.